NASA/TM-2003-212236/Vers.2/Vol.3

Topography Experiment (TOPEX) Software Document Series

Volume 3
WFF TOPEX Software Documentation
Altimeter Instrument File (AIF) Processing

October 1998

Raytheon ITSS
Jeffrey Lee
Dennis Lockwood
NASA/GSFC Wallops Flight Faclity
Wallops Island, Virginia 23337

TOPEX Contact:

David W. Hancock III
NASA/GSFC Wallops Flight Facility
Wallops Island, Virginia 23337

The TOPEX Radar Altimeter Technical Memorandum Series is a collection of performance assessment documents produced by the NASA Goddard Space Flight Wallops Flight Facility over a period starting before the TOPEX launch in 1992 and continuing over greater than 10 year TOPEX lifetime. Because of the mission's success over this long period and because the data are being used internationally to redefine many aspects of ocean knowledge, it is important to make a permanent record of the TOPEX radar altimeter performance assessments which were originally provided to the TOPEX project in a series of internal reports over the life of the mission. The original reports are being printed in this series without change in order to make the information more publicly available as the original investigators become less available to explain the altimeter operation and details of the various data anomalies that have been resolved.

Foreword

This document is a compendium of the WFF TOPEX Software Development Team's knowledge regarding Altimeter Instrument File (AIF) Processing. It includes many elements of a Requirements Document, a Software Specification Document, a Software Design Document, and a User's Manual. In the more technical sections, this document assumes the reader is familiar with TOPEX and Instrument files

Acknowledgments

The author gratefully acknowledges the contributions of the members of the Wallops Flight Facility TOPEX Team:

- Ronald Brooks (Raytheon)
- J. Barton Bull (NASA GSFC / WFF)
  Altimeter System Engineer
- Ronald Forsythe (NASA GSFC / WFF)
- David Hancock (NASA GSFC / WFF)
  TOPEX Altimeter Verification Manager
- George Hayne (NASA GSFC / WFF)
  TOPEX Altimeter Verification Manager
- Hayden Gordon (Computer Sciences Corporation)
- Jeff Lee (Raytheon)
- Dennis Lockwood (Raytheon)
- Carol Purdy (Raytheon)
- Craig Purdy (NASA GSFC / WFF)
  TOPEX Altimeter Sensor Development Manager
- Larry Rossi (NASA GSFC / WFF)
  TOPEX Altimeter Manager
- Rob Ryan (Computer Sciences Corporation)
- Bill Shoemaker (SMSRC)

Table of Contents

List of Figures

List of Tables

Section 1

Introduction

1.1 Purpose

This document provides a detailed description of TOPEX Altimeter Instrument File (AIF) Processing at NASA Goddard Space Flight Center's Wallops Flight Facility (WFF). AIF Processing is work-in-progress and this document will be updated to reflect changes in the documented software or procedures.

1.2 Scope

This document is Volume 3 in a series of publications generated by the TOPEX Software Development Team (SWDT) at WFF. Volume 1 is an overview of the project and its processes. Volume 2 documents pre-launch Radar Altimeter System Evaluator (RASE) processing. Volumes 4 and 5 document Sensor Data Record (SDR) and Geophysical Data Record (GDR) processing, respectively. Volume 6 covers Special Processing which does not fall into any of the other categories. The series is an attempt to document SWDT software and procedures used in support of TOPEX at WFF.

1.3 Organization of Document

Section 2 lists other documents related to this document. Section 3 describes Altimeter Instrument Files. Sections 4, 5 and 6 document Daily, Weekly, and Special Processing, respectively. Section 7 details the components of AIF processing. Appendix A contains samples of AIF Standard Products. Appendix B lists programs and software used and developed. Appendix C describes the contents of AIF output files and databases. Appendix D has plots of reference values used in AIF Processing. Appendix E is the change history of AIF processing software. Appendix F contains significant documents and memos related to AIF Processing.

Section 2

Related Documentation

- *TOPEX/POSEIDON Joint Verification Plan*, June 15, 1992, JPL92-9.
- *TOPEX Mission Radar Altimeter Engineering Support Plan*, May 1992, NASA GSFC WFF.
- *TOPEX Project Radar Altimeter Development Requirements and Specifications*, August 1988, NASA GSFC WFF 672-85-004.
- *TOPEX Ground System Algorithm Specification Document*, September 1990, JPL D-7075 (Rev. A), TOPEX 633-708.
- *TOPEX Ground System Software Interface Specification (SIS-2) Instrument File*, October 8, 1991, JPL D-7925 (Rev. A), TOPEX 633-731-23-007, Rev. A.
- *Interface Control Document between the TOPEX Ground System and the Goddard Space Flight Center/Wallops Flight Facility Oceans Laboratory*, (Rev. 2.0), July 1990, TOPEX 633-712J.
- *Wallops Flight Facility TOPEX Project Software Products Specification for Engineering Assessment Software*, January 1991.
- Applied Physics Laboratory, *TOPEX Radar Altimeter System Specification*, APL Document 7301-9028.
- Hancock, D. W., III, 1989, *Studies in Support of The NASA Ocean Topography Experiment (Report 1)*, NASA TM-100766.
- Zieger, Alfred R., David W. Hancock, III, George S. Hayne, and Craig L. Purdy, June 1991, *NASA Radar Altimeter for The TOPEX/POSEIDON Project*, Proceedings of The IEEE, Vol. 79, No. 6, pp. 810-826.
- Marth, P. C., J. R. Jensen, C.C.Kilgus, J. A. Perschy, and J. L. MacArthur of The Johns Hopkins University Applied Physics Laboratory; D. W. Hancock, III, G. S. Hayne, C. L. Purdy, and L. C. Rossi of NASA GSFC WFF; and C.J. Koblinsky of NASA GSFC, *Pre-Launch Performance of the NASA TOPEX/POSEIDON Altimeter*, IEEE Transactions on Geoscience and Remote Sensing, 31(2), pp. 315-332, 1993.
- Hancock, D. W., III, R. L. Brooks and H. A. Goldberg, June 1992, *Performance Parameters for The TOPEX Radar Altimeter from Bench Testing through Spacecraft Thermal Vacuum Testing*, NASA GSFC WFF.

Selected documents and memos are also included in Appendix F-Attachments for completeness.

Section 3

Altimeter Instrument Files

3.1 Definition

Altimeter Instrument Files (AIFs) are created daily by the TOPEX Ground System (TGS) at the Jet Propulsion Laboratory (JPL). These files provide WFF with the most immediate look at the health and status of the TOPEX altimeter. The flow of altimeter data is depicted in Figure 3-1 "TOPEX ALT Dataflow (AIF Emphasized)", where emphasis is placed on the AIF data flow.

The TOPEX Ground System extracts altimeter science and engineering minor frames from the spacecraft telemetry. Common frames are merged and time-sorted to create AIFs. AIFs are created in eight-hour segments usually corresponding to a play-back period. WFF users may request that segments of less than eight hours be created and made available on a special by-request basis.

At the end of a UTC day, the three eight-hour segments are merged into one twenty-four hour file and placed in a shared storage area on TGSC. For a complete description of the AIF formats, see JPL D-7925 TOPEX Ground System Software Interface Specification (SIS-2) Instrument File.

3.2 Distribution

Altimeter Instrument Files are made accessible to WFF via the NASA Science Internet (NSI) using either DECNET or FTP protocols. WFF does not redistribute AIFs.

3.3 Storage

A full set of twenty-four hour AIF science and engineering files consumes approximately 105 megabytes of disk space. A week of instrument files is kept in the working area at WFF. Instrument files over a week old are rolled off onto 2.2GB Exabyte tape for archive. Every AIF generated has been archived and is available for use at WFF.

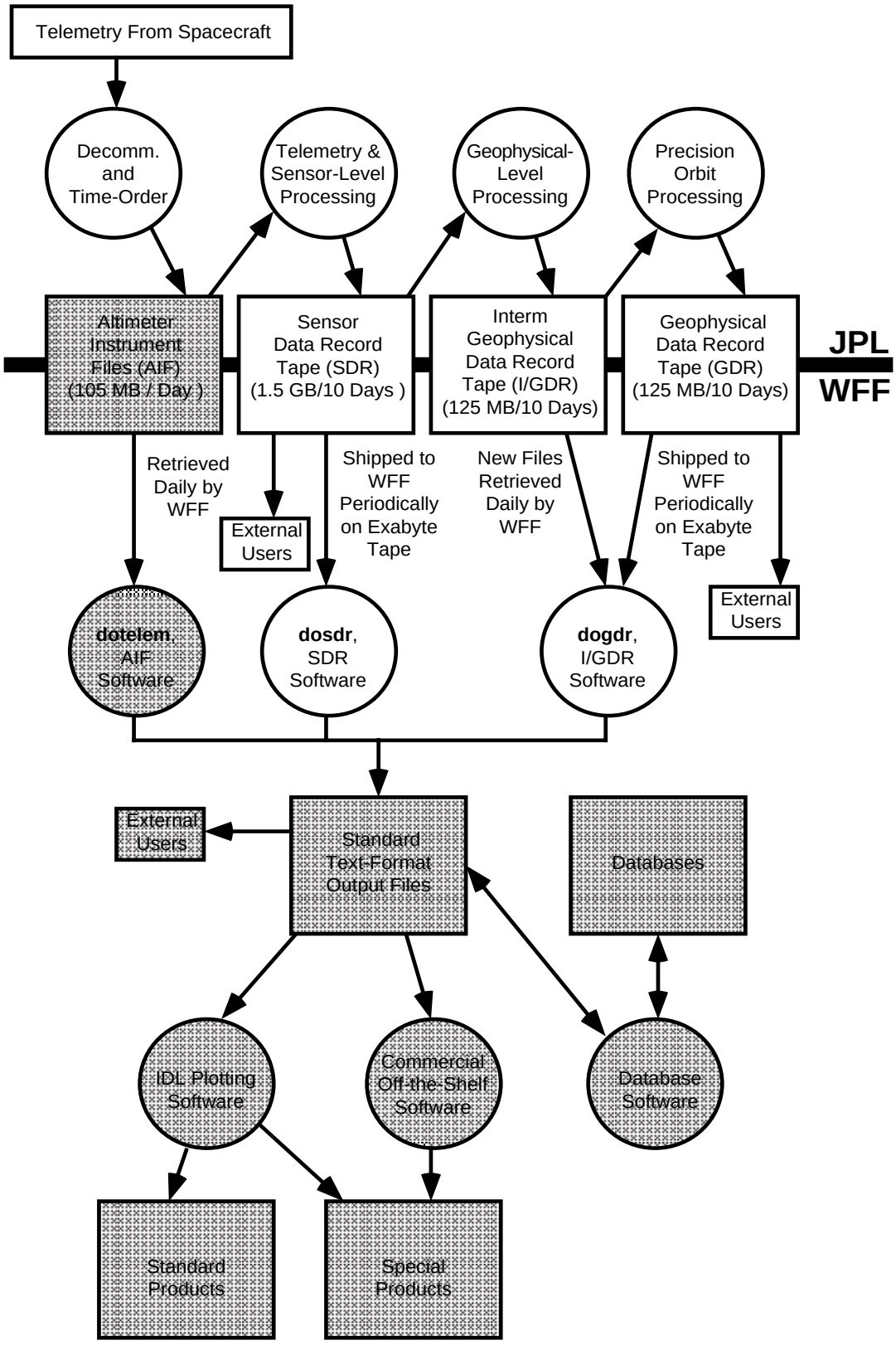

Figure 3-1 TOPEX ALT Dataflow (AIF Emphasized)

Section 4

AIF Daily Processing

AIFs are automatically retrieved from JPL and processed by WFF. The daily processing script, **autoaif**, is executed each day at 0800 UTC by the UNIX crontab facility. The timing is set up such that when WFF personnel arrive to work, all daily processing is complete and the standard products are available for inspection. See Figure 4-1 "TOPEX AIF Daily Processing" for diagram of daily processing. Appendix A contains samples of the daily products produced by **autoaif. autoaif** performs the following functions (in order).

- Runs **ftpjplbin**, which uses FTP to transfer Science, Engineering, and Selected Telemetry Record (STR) AIF files from JPL via NSI/SPAN. If the transfer is not successful, the program will retry the copy 300 times with a 180 second timeout between copies. A log is kept of the processing; upon completion, this log is electronically mailed to the user who invoked the process. See Figure A-1 “AIF Processing Log Produced as Part of Daily Processing”.
- Runs **dotelem**, the primary data reduction program. It creates 15-second Science Averages, Event Listings, 5-minute Engineering Averages, and CAL, Engineering, Waveform, and Header database import files.
- Runs **aifhdr**, a UNIX script that runs the IDL program **aifhdr.pro** to read the **dotelem** Event Listing and generate a Processing Summary report. See Figure A-2 “AIF Processing Summary Produced as Part of Daily Processing”.
- Runs **aifcal**, a UNIX script that runs the IDL program aifcal.pro to read the **dotelem** database CAL file and create Daily AIF CAL plots. See Figure A-3 “AIF CAL Plot Produced as Part of Daily Processing”.
- Runs **dailyeng**, a UNIX script that runs the IDL program **dailyeng.pro** to read the **dotelem** Engineering Averages file and create Daily AIF Engineering plots. See Figure A-4 “AIF Engineering Plot Produced as Part of Daily Processing”.
- Runs **aifsci**, a UNIX script that runs the IDL program **aifsci.pro** to read the **dotelem** Science Averages file and create Daily AIF Engineering plots. See Figure A-5 “AIF Science Plots Produced as Part of Daily Processing”.
- Runs **dailywf**, a UNIX script that runs the IDL program **wfdiff.pro** to read the **dotelem** database Waveform files and create Daily AIF Waveform Difference plots. See Figure A-6 “AIF Waveforms Difference Plot Produced as Part of Daily Processing”.
- Prints the **dotelem** Events Listing. See Figure A-7 “AIF Events Report Produced as Part of Daily Processing”.
- Concatenates the **dotelem** database files into the corresponding merged AIF database file in /gen/topex2/dbase.
- Moves the AIF files into /gen/flight/aif, the AIF Storage area.

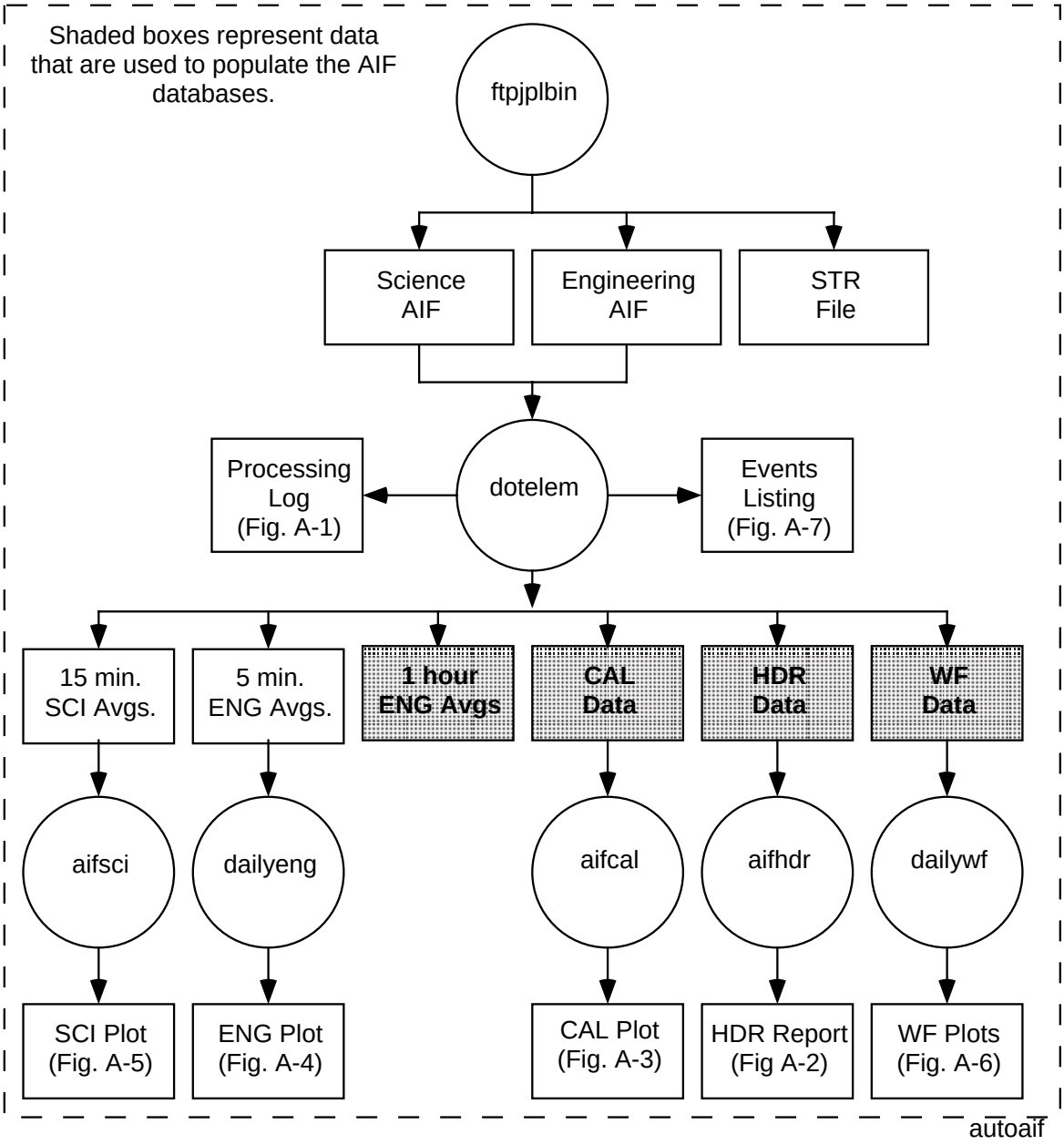

Figure 4-1 TOPEX AIF Daily Processing

Section 5

AIF Weekly Processing

Each week, the merged AIF database files are copied to the TOPEX Macintosh Quadra 900 and imported into the AIF Databases. After this is done, all data in the databases are exported to create Launch-to-Date files. The Launch-to-Date files are copied back to osb3 and the UNIX script **launchtodate** is run. **launchtodat**e runs IDL programs that create the standard Launch-to-Date plots. The diagram for weekly AIF processing is shown in Figure 5-1 "TOPEX AIF Weekly Processing". Appendix A contains samples of the weekly products. **launchtodate** performs the following functions (in order).

- Runs **dbcal**, a UNIX script that runs the IDL program **aifcal.pro** to read the database extraction CAL file and create Launch-to-Date AIF CAL plots. See Appendix A, Figure A-8 “Launch-to-Date CAL Plot Produced as Part of Weekly Processing”.
- Runs **dbeng**, a UNIX script that runs the IDL program **aifeng.pro** to read the database extraction Engineering file and create Launch-to-Date AIF Engineering plots. See Appendix A, Figure A-9 “Launch-to-Date ENG Plot Produced as Part of Weekly Processing”.
- Runs **dbwf**, a UNIX script that runs the IDL program wfdiff.pro to read the database extraction Waveform files and create Launch-to-Date AIF Waveform Difference plots. See Appendix A, Figure A-10 “Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing.

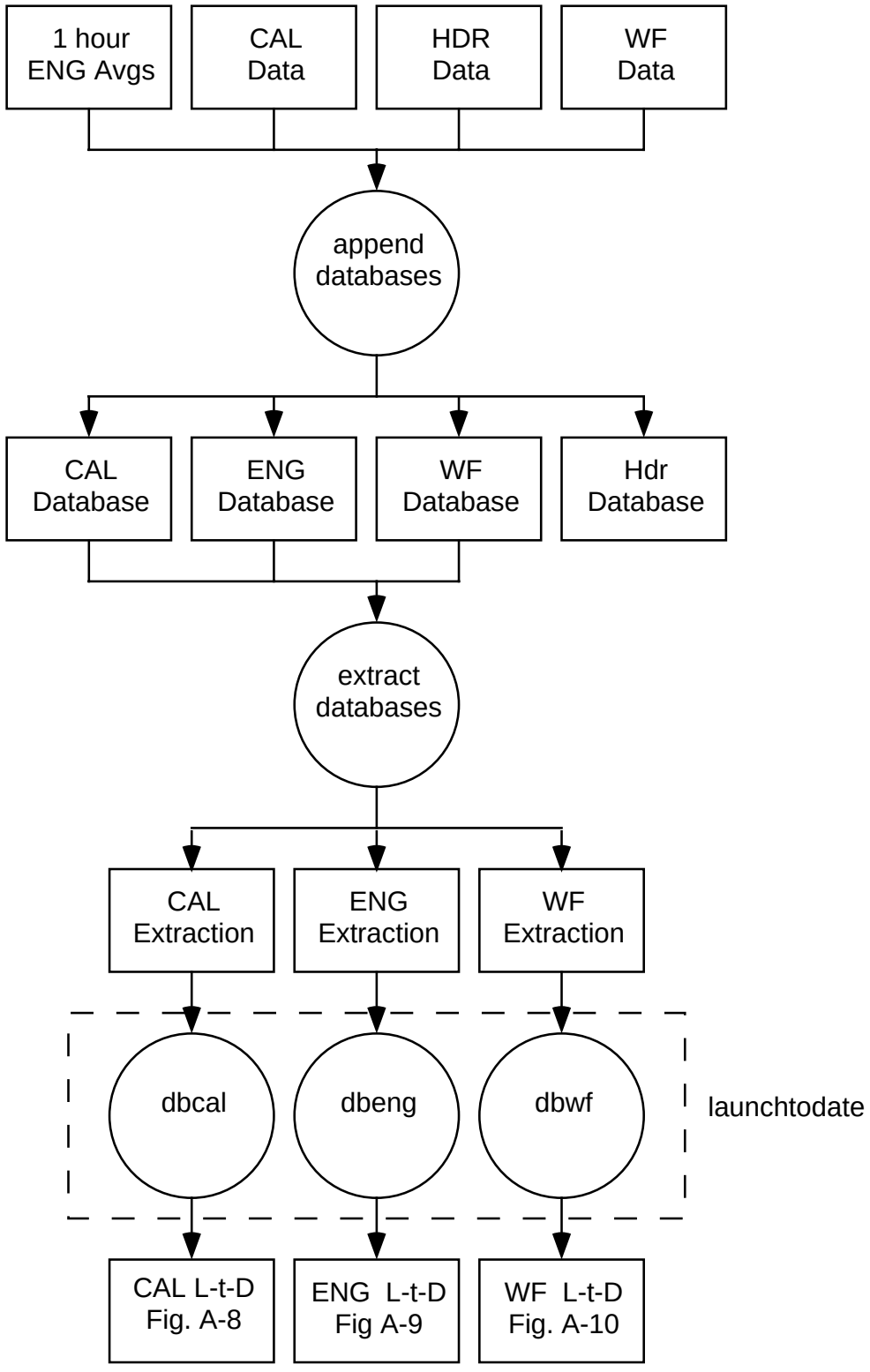

Figure 5-1 TOPEX AIF Weekly Processing

Section 6

AIF Special Processing

Special processing is defined as that processing which is not done on a regular chronological basis. Many **dotelem** products can be used for special processing along with commercial-off-the-shelf (COTS) software. Special processing can also be performed using IDL and Database Software. There are many other forms of special processing performed on TOPEX data; this section explains the general methods by which special processing is performed.

6.1 dotelem Special Processing

In general, AIF Special Processing is performed by using **dotelem** to create one or more special output files. The resulting files are then copied to a user for analysis or one of the TOPEX SWDT members uses custom IDL or COTS software to create the desired product. Any **dotelem** option can be used for special processing, but one of the more common ones is Waveform Averages.

6.2 IDL Special Processing

Another way to perform special processing is to create special IDL plot programs. This has been done on occasion to create special plots for papers and/or presentations. Many of the standard IDL programs can also be run using non-standard arguments to produce plots according to custom specifications.

6.3 Database Special Processing

Custom database programs have been written to perform special processing. Some examples of these include routines to apply experimental temperature corrections, extract corresponding CAL and ENG data, and create other types of special output files.

6.4 Examples of Special Processing

Two examples of special processing include: (1) plotting AIF waveforms using both IDL and WingZ; and (2) plotting engineering data over the last 60 days.

6.4.1 Plotting Waveforms

To plot waveforms, **dotelem** is run to create averages of the data over a user-specified time interval. The resulting waveform average files are processed with topexwf (for fixed scales) or **topexautowf** (for automatic scales). This is the first-level waveform product. A sample waveform average plot is shown in Figure A-11 “Waveform Average Plot Produced as Part of Special Processing”.

If a more detailed look is required, the waveform average file can be processed using the **WingZ plot3d** program on a Macintosh. The waveform average file is copied to

the Macintosh hard disk and transformed into a WingZ file. The program **unix2wingz** translates the waveform average file into the correct format. **WingZ** is launched and the **plot3d** script opened. The waveform wingz file is opened and the header row and columns B through M of the spreadsheet deleted. Finally, the plot3d script is run. The rest of the processing is interactive using the controls shown in Figure 6-1 “WingZ plot3d Interface”.

6.4.2 Plotting Last 60 Days of ENG Data

To plot the last 60 days of engineering parameters, data must be extracted from the AIF Engineering Database. The user would run the database program and extract engineering data, selecting the range of dates he wishes to extract. See Figure 6-2 “Database Extraction Screen for a picture of the data extraction screen. Once the data are extracted, the database extraction file is copied to the Sun, and the IDL **aifeng** program is run to create the desired plots.

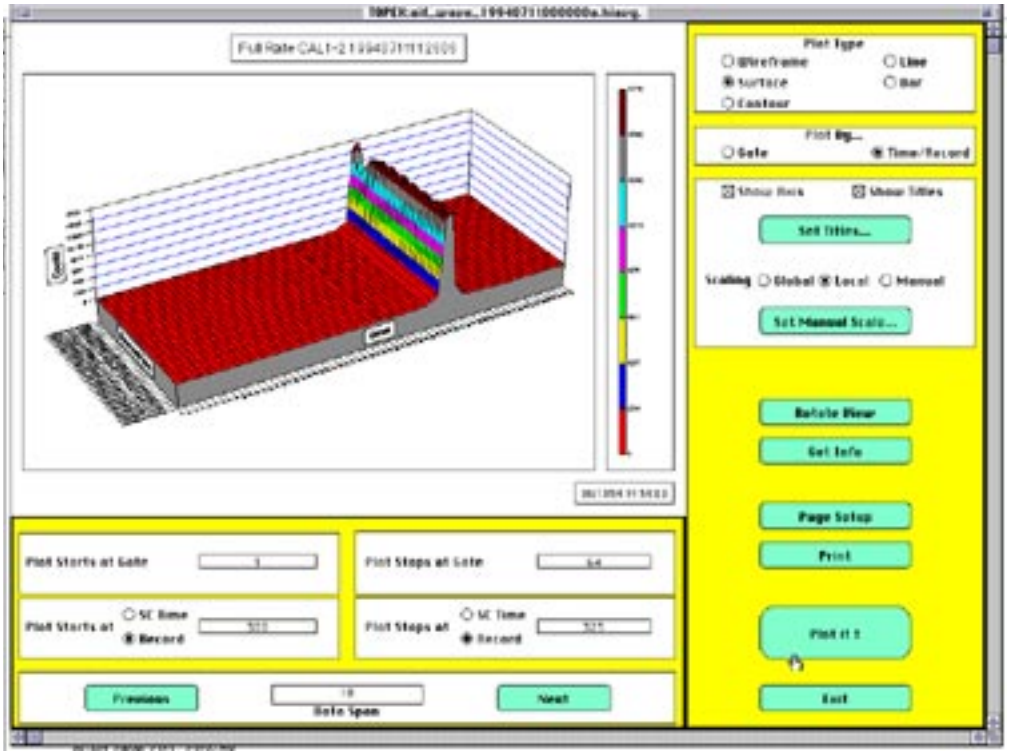

Figure 6-1 WingZ plot3d Interface

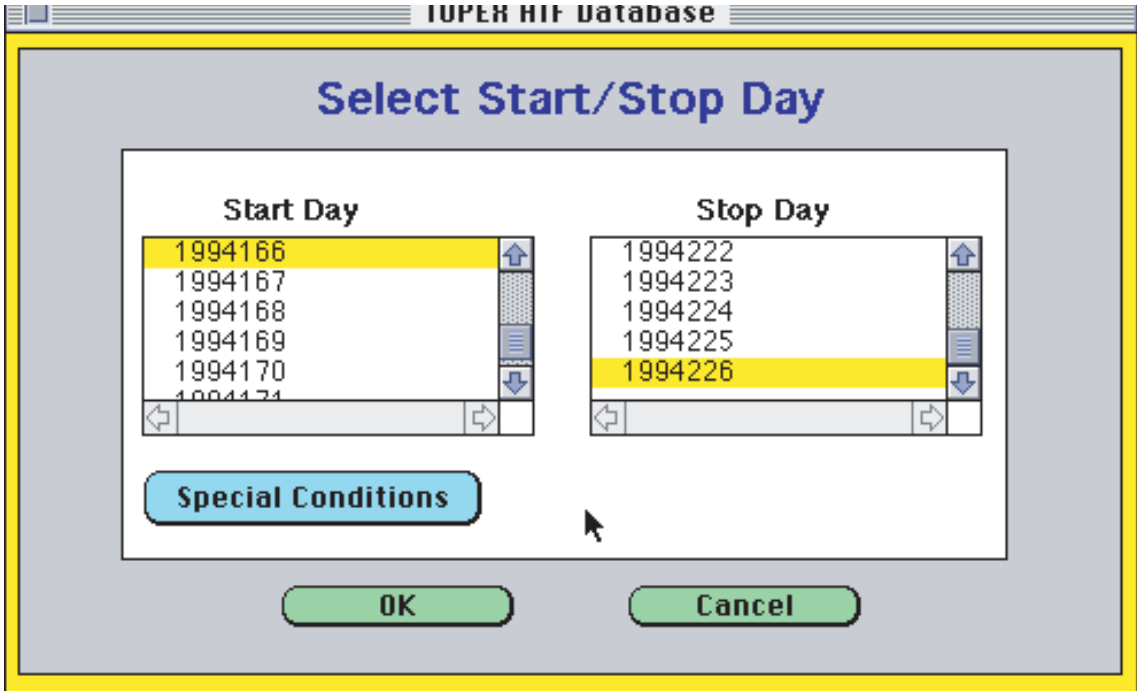

Figure 6-2 Database Extraction Screen

Section 7

Components of AIF Processing

Figure 7-1 depicts the flow of AIF data during processing. There are four major components of AIF processing software: **dotelem**, the FORTRAN which performs initial data processing; AIF databases, which handle data storage, retrieval, and secondary processing; IDL programs, which handle most of the plotting duties; and UNIX scripts, which automate much of the processing. These components comprise a system that is sufficiently automated to handle standard processing tasks and yet flexible enough to assist in highly-detailed engineering assessment investigations.

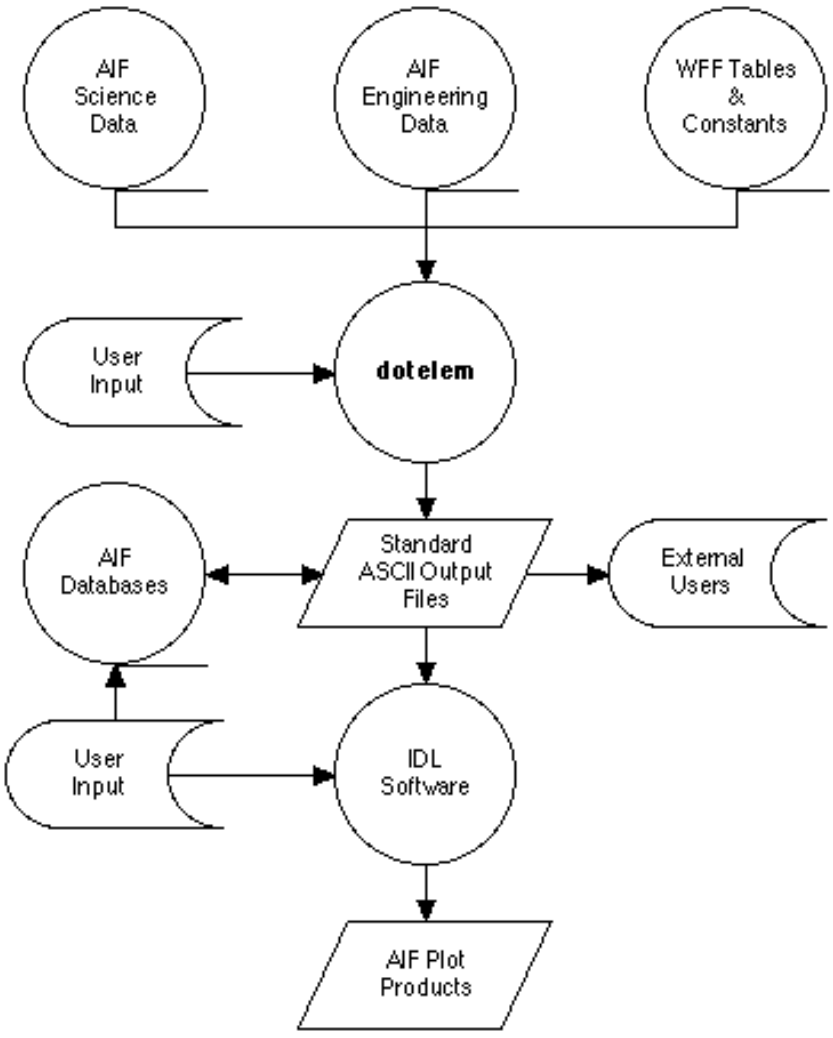

Figure 7-1 AIF Processing Dataflow

7.1 dotelem

dotelem is the FORTRAN program responsible for all AIF data processing. It is highly interactive, allowing the user to choose what process to run and to specify customized parameters for the chosen process. .Figure 7-2 "dotelem Startup Screen"

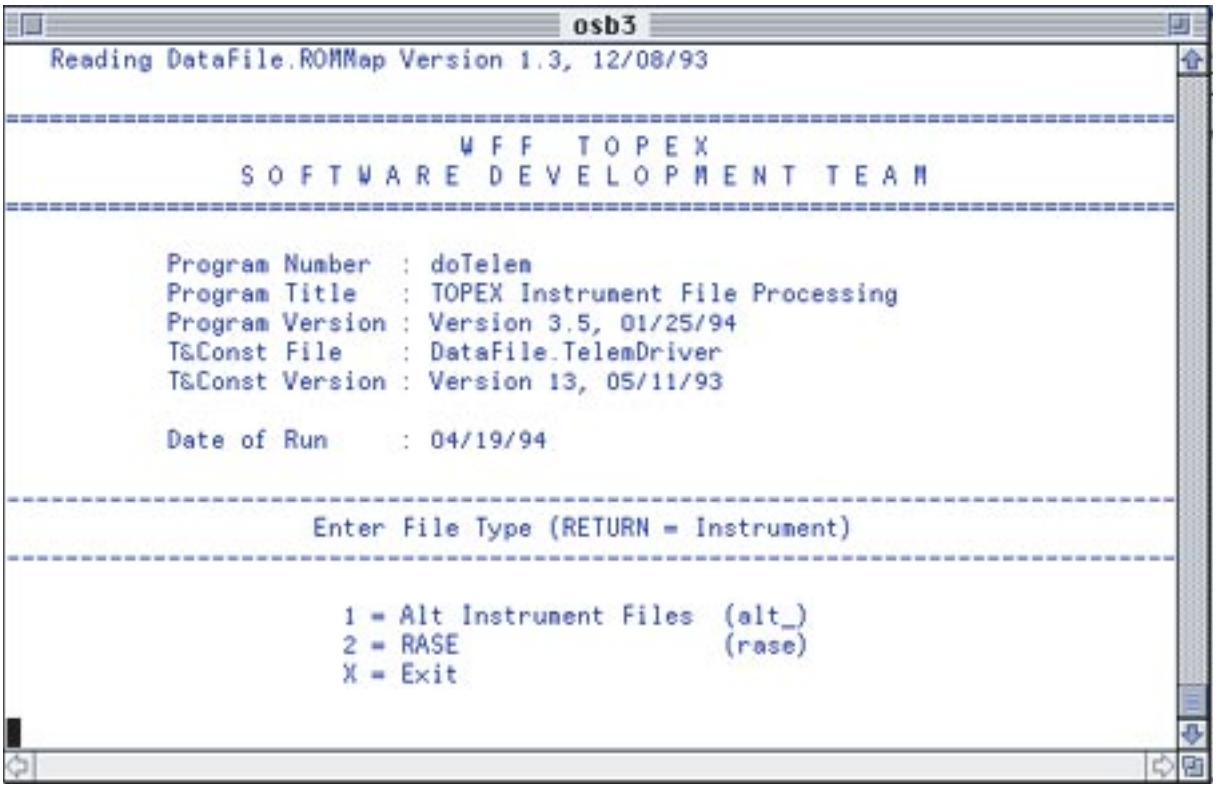

Figure 7-2 dotelem Startup Screen

depicts the **dotelem** startup screen. **dotelem** has three main components: the Initialization Module, the User Input Module, and the Data Processing Loop. Figure 7-3 "dotelem Main Processing" on page 7-3 diagrams the highest-level **dotelem** processing.

The software currently runs on **osb3**, a Sun Microsystems SparcStation 10 UNIX workstation. However, since **dotelem** was originally coded on the Apple Macintosh platform, and then ported to the Sun environment, the code has been designed to be highly portable.

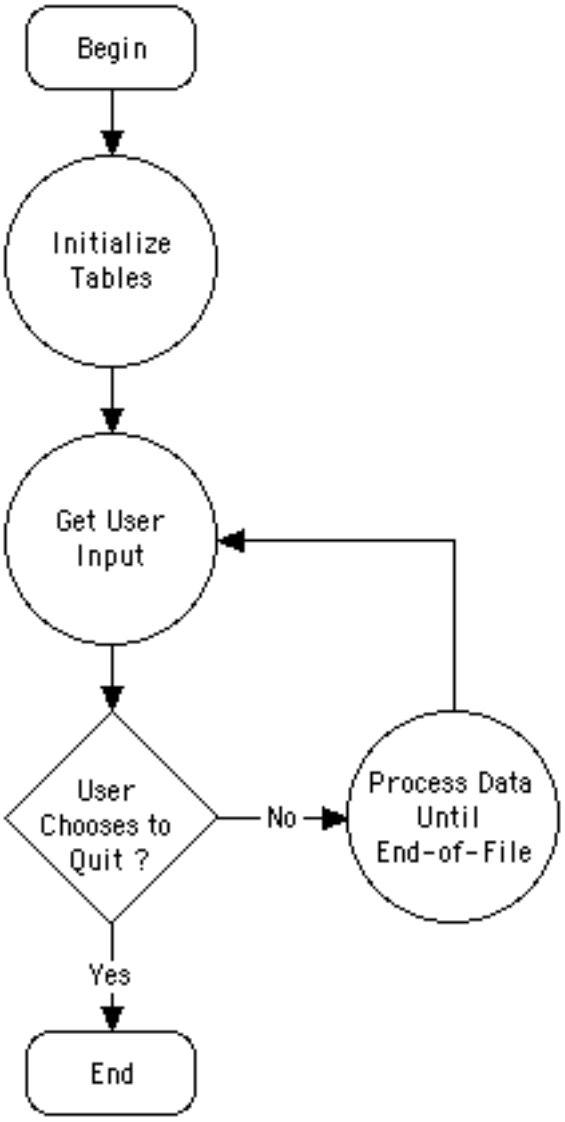

Figure 7-3 dotelem Main Processing

7.1.1 dotelem Initialization Module

Upon startup, **dotelem** initializes several data structures needed to decode and process data. There are basically three types of data structures used: byte maps, constants tables, and look-up tables. Byte maps are used for easily referencing which bytes in the raw telemetry data correspond to which converted engineering units. Constants tables contain constants used by various processing routines and are initialized by reading values from appropriate external files. Lookup tables are used for such things as integer to mnemonic conversion, memory maps, and labeling. Table 7-2 lists the data structures initialized by **dotelem**.

Table 7-1 Data Structures Initialized by dotelem

Structure	Description
TelemEngDef	Byte map of data contained in the AIF engineering record.
TelemSciDef	Byte map of data contained in the AIF science record.
TelemConstDef	Constants table used by telemetry processing.; Read from DataFile. TelemDriver.
SensorConstDef	Constants table for SDR creation. Read from DataFile.SensorDriver.
CMDTableDef	ASCII codes for converting integer commands to mnemonics. Read from DataFile.CMD.
EngLabel	Table of labels for identifying engineering parameters.
EALimitsDef	Constants table for Engineering Assessment. Contains reference values for CAL and Waveform data, as well as other engineering assessment constants. Read from DataFile.EALimits.
ROMMapDef	Table of reference addresses and 32-bit hex dumps for determining that altimeter ROM has not been corrupted. Read from DataFile. ROMMap.

7.1.2 dotelem User Input

. **dotelem** is designed to be highly interactive and offer the user a variety of processing options. The user must enter the UTC time of the file to process and must select a processing method; the processing selection screen is shown in Figure 7-4 "dotelem Primary User Input Screen" on page 7-5. The user may optionally set custom parameters such as averaging time, mode selection, and parameters to report. Defaults are provided in all cases. Figure 7-2 "dotelem Startup Screen" lists processing types, options, and defaults. Time selection is available as an option for all processes.

7.1.3 dotelem Processing Loop

After a user has chosen what process(es) to run and what options to use, **dotelem** runs in a processing loop until either all data have been read from both science and

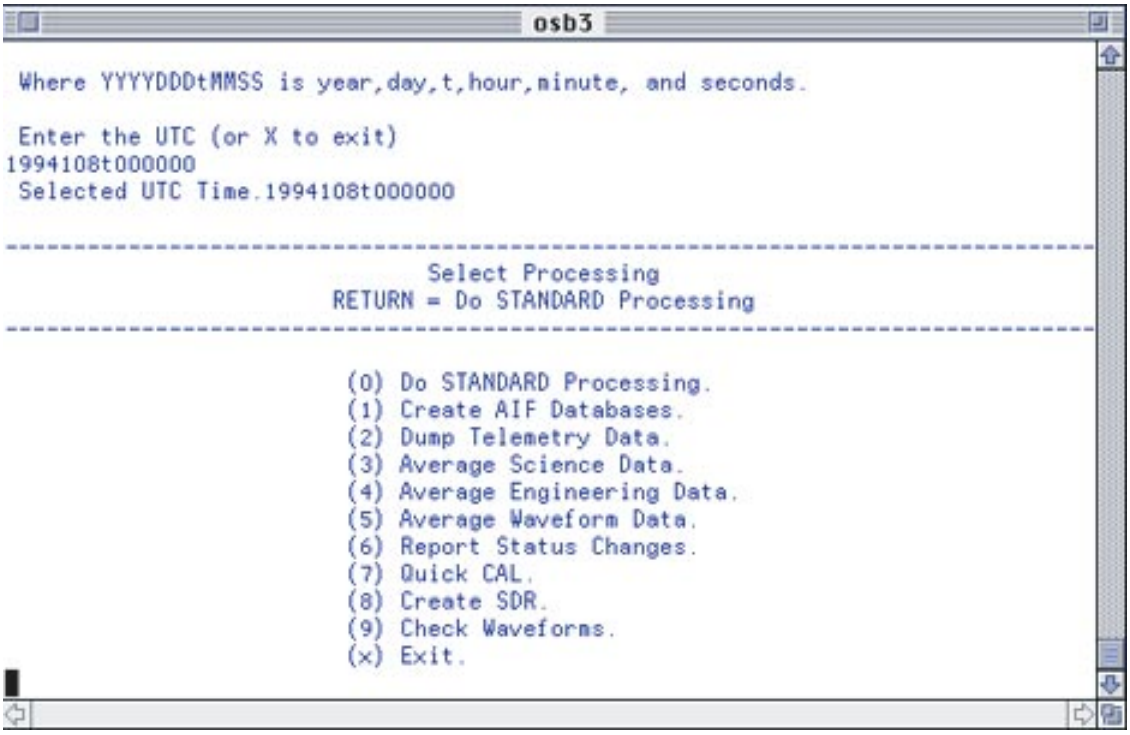

Figure 7-4 dotelem Primary User Input Screen

Table 7-2 dotelem Processing Options

Parameter	Options	Defaults
STANDARD Processing (default process)	None	Create AIF Datgabases 15 sec Science3 Avgs. 5 min Engineering Avgs.
Create AIF Databases	None	1 Hour Engineering Avgs. CAL Mode Processing Check Waveforms Check Commands Check Science Check Engineereing
Dump Telemetry Data	Dump What Data Dump Full Rate Time Selection	Science and Engineering No Process All Data
Average Science Data	Seconds to Average What Modes Time Selection	60 Seconds Track Modes Process All Data
Average Engineering Data	Seconds to Average What Modes Time Selection	60 Seconds Track Modes Process All Data

Table 7-2 dotelem Processing Options (Continued)

Parameter	Options	Defaults
Average Waveform Data	Seconds to Average What Modes Time Seletion	60 Seconds Track Modes Process All Data
Report Status Changes	Check What Data Check What Params Time Selection	S cience and Engineering All Parameters Process All Data
QuickCAL	None	None
Create SDR	Debug Algorithms	No
Check Waveforms	None	None

engineering files, or a time is detected that is later than a user-specified stop time. **dotelem** branches off the main loop to run those processes the user has specified.

7.1.4 dotelem Time Synchronization

Since AIF science and engineering data are sampled at different rates, the data must be time-synchronized during processing. The synchronization must take into account such factors as the lack of science data during the IDLE mode, data dropouts, and corrupted records. Thus, it is important to validate the data used for time synchronization so that a non-valid record has as little an impact as possible on the synchronization routines.

When processing is started, time synchronization is initialized by reading the first valid engineering and science frames. The engineering time is stored in both EngTime and NextEngTime, and the science time is stored in SciTime. The record pointer is then reset to the beginning of each file.

SciTime, the time of the current science record, is compared to NextEngTime, the time of the next engineering record, to see if a new science record should be read. If there are more science data and SciTime is less than or equal to the NextEngTime, or there are no more engineering data, then a new valid science record is read. The time of the newly-read science record is stored into SciTime.

NextEngTime is then compared with SciTime. If there are more engineering data, and NextEngTime is less than or equal to SciTime, or there are no more science data, then a new valid engineering record is read. The time of the newly read engineering record is stored into EngTime. The next valid engineering record is read and the pointer reset to the previous valid engineering record. The time of the next valid engineering record is stored into NextEngTime.

The synchronization process is robust and does correctly synchronize science and engineering data. The key to the success of synchronization is the careful validation process through which newly-read AIF records must pass. Figure 7-5 "AIF Time Synchronization" details the AIF Time Synchronization Process.

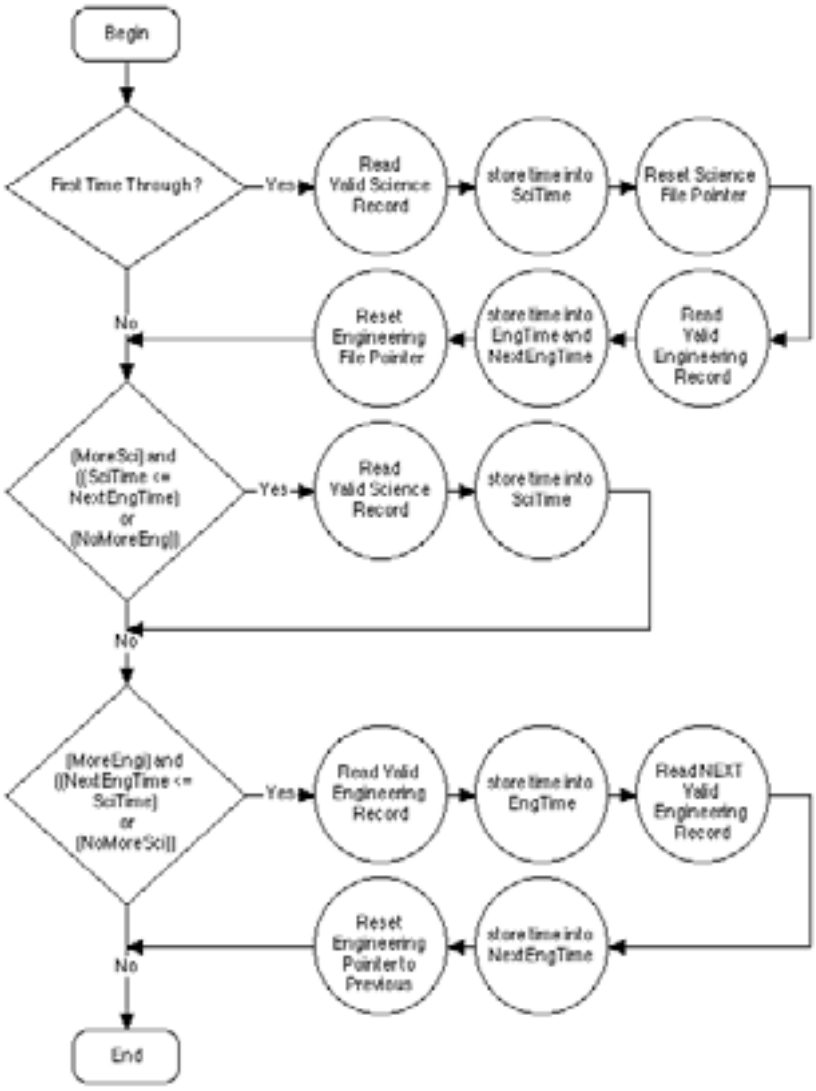

Figure 7-5 AIF Time Synchronization

7.1.5 dotelem Record Validation

AIF Science and Engineering data must be time-synchronized; it is critical that records are carefully checked during the data-input process. Since AIF data are assumed to be time-ordered, a corrupt time may cause the synchronization process to delete a great deal of valid data in the attempt to synchronize with an invalid time. **dotelem** performs extensive checking to ensure the validity of AIF records. There are three levels of error-checking performed. If the record passes all three levels, it is assumed to contain valid data.

The first level of error-checking uses the appropriate T4108 Preliminary Flags algorithm to check the Science or Engineering Frame Checksum. T4108 sets FlgEC4108 if it detects a bad checksum in the engineering record and sets FlgSC4108 if it detects a bad checksum in the science record. T4108 also sets FlgER4108 if it detects a reset. If any of these flags are set, the appropriate record is considered non-valid and is deleted.

The second level of error-checking examines the contents of the AIF record header. The important fields in the header are the Continuity Map and Data Quality Map. The Continuity Map field verifies the presence of each major and minor frame necessary to complete the record. The Data Quality Map field verifies the checksum of each major and minor frame necessary to complete the record. If any Continuity or Data Quality flags are set, the record is considered non-valid and is deleted.

The third and final level of error-checking tests the science or engineering Sync Byte. This step was necessary because a record containing all zeros would checksum correctly, but would not be valid for use in processing. If the Sync Byte does not match the appropriate science or engineering reference value, the record is considered non-valid and is discarded.

If an AIF record passes all tests, it is considered valid for use in time synchronization and further processing. The AIF Record Validation process is time-tested and has been proven to prevent non-valid data from being used during further processing. Furthermore, it has also been proven to delete only non-valid records. Figure 7-6 "AIF Record Validation" on page 7-9 provides a diagram of how this process works.

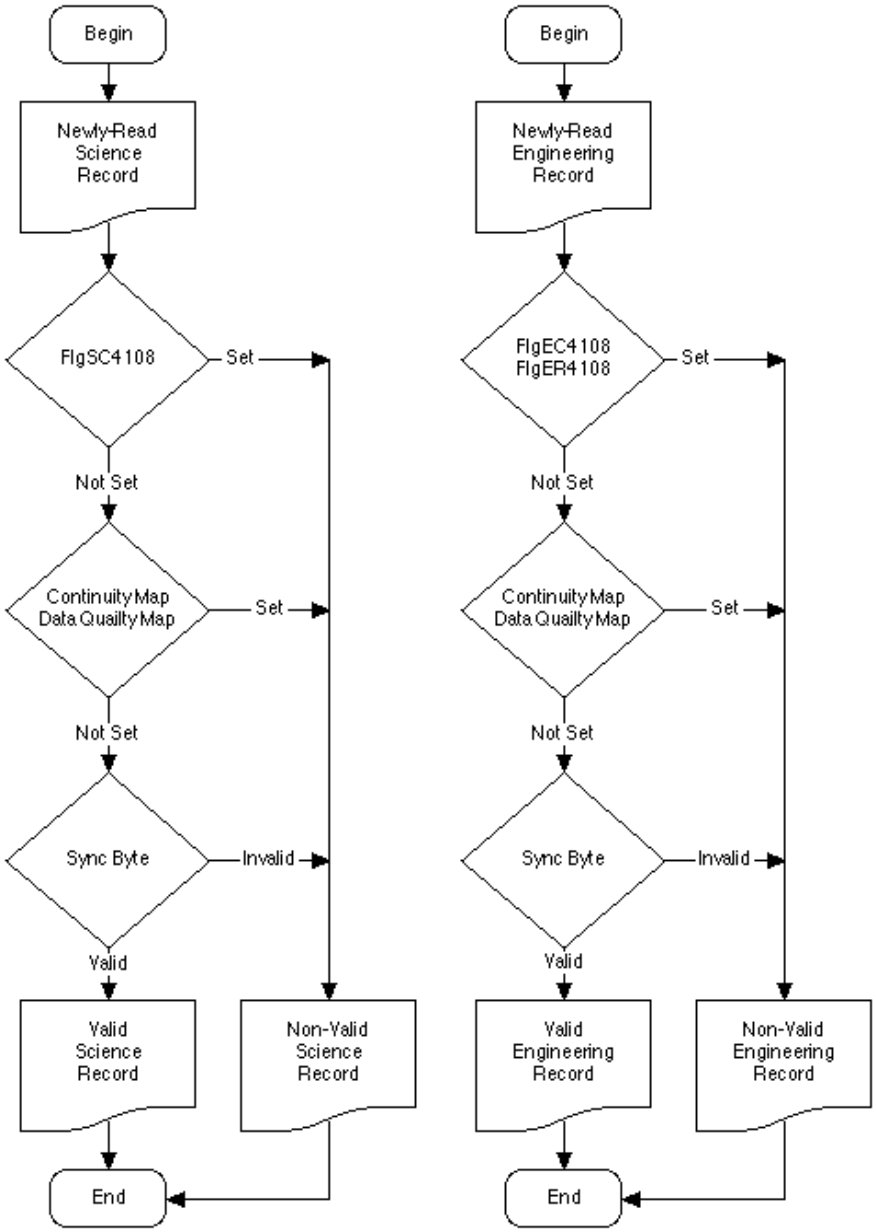

Figure 7-6 AIF Record Validation

7.1.6 dotelem Science Unit Conversion

AIF Science data must be converted from raw telemetry data into engineering units to be used during processing. The process that performs this conversion is **scieuconv**. Algorithm T3117 Science Data EU Conversion is used for most of the conversion.. However, some additional parameters need to be decoded for further AIF processing; Table 7-3 "Other Converted AIF Science Parameters" on page 7-10 lists the parameters that are needed, but not decoded by T3117

7.1.7 dotelem Engineering Unit Conversion

AIF Engineering data must be converted from raw telemetry data into engineering units to be used during processing. The process that performs this conversion is **engeuconv**. Algorithm T3107 Engineering Data EU Conversion is used for most of the conversion. However, some parameters not included in T3107 need to be decoded for further AIF processing. Table 7-4 "Other Converted AIF Engineering Parameters" on page 7-10 lists the parameters that are needed, but not decoded by T3107.

7.1.8 dotelem Standard Processing

Standard Processing is the default process for **dotelem**. Standard Processing calls several of the other processing modules with specific parameters. Table 7-5 "Standard Processing Modules & Parameters" on page 7-12 lists the modules called and corresponding parameters supplied. See Appendix C for output file formats

Table 7-3 Other Converted AIF Science Parameters

Parameter	Description
Last_ICA_Command Last_ATA_Command	Converted into appropriate text mnemonic by table lookup using DtaFile.CMD. Other parameters converted include command type, status, and command count (if appropriate).
Sync_Mode_Byte	Converted into integer representation.
Calib_Atten_Ku Calib_Atten_C	Converted into Ku and C band integer representations. Further decoded into Cal Mode Step.
Limit_Byte	Converted into integer representation.
Current_Mode	Converted into integer representation.
Mode_Change	
Test_Mode	Converted into integer representation.
Operation_Mode_Byte	Converted into integer representation.

Table 7-4 Other Converted AIF Engineering Parameters

Parameter	Description
Last-Command	Converted into appropriate text mnemonic by table lookup using DataFile.CMD. Other parameters converted include command type, command status, and command count (if appropriate).
Memory_Dump_Address	Converted into hexadecimal representation.
Memory-Dump	Converted into hexadecimal representations.
Alt_Eng_Status	Mode extracted and converted into appropriate mnemonic by table lookup.
Alt_Eng_49 Alt_Eng_50	Converted into integer representations (BiLevels).
Memory_Checksum	Converted into hexadecimal representation.
Sum_Count	Converted into hexadecimal representation.

Table 7-5 Standard Processing Modules & Parameters

Module	Parameters
Average Science	15 Second Averages, Track Modes Only
Average Engineering	5 Minute Averages, All Modes
Average Engineering	1 Hour Averages, All Modes
Average Cal1 Waveforms	Average by step, Cal1 Mode Only
Check Status	Check Science & Engineering, Check Standard Parameters
QuickCAL	- no options available-
Check Waveforms	- no options available-

7.1.9 dotelem Create AIF Databases

Create AIF Databases calls several of the other processing modules with specific parameters. Table 7-6 lists the modules called and corresponding parameters supplied. See Appendix C for output file contents and formats.

Table 7-6 Create AIF Databases Modules & Parameters

Module	Parameters
Average Engineering	1 Hour Averages, All Modes
Check Status	Check Science & Engineering, Check Standard Parameters
QuickCAL	- no options available-
Check Waveforms	- no options available-

7.1.10 dotelem Dump Telemetry

The telemetry dumping routine, **dumptelem**, simply dumps all decoded parameters in each science and/or engineering record to output files. The user may specify if all data are to be dumped or just the first entry of each parameter array. See Appendix C for output file contents and formats.

7.1.11 dotelem: Average Science Data

The science data averaging routine, **sciavg**, runs on a record-to-record basis and performs two similar but distinct functions: the creation of science averages files and the creation of daily science plot files. The basic algorithm is the same for both processes, but the creation of daily science plot files requires special handling to insure that land data are not used during computations. Processing the AIF science data are complicated by the lack of latitude/longitude and land/water flags. This deficiency reduces the usefulness of AIF science data and eliminates the requirement for WFF to keep AIF science databases.

The **sciavg** processing begins with checking the mode of the current science record. The worse mode of the two modes is assigned to the variable **WorseMode**. This vari-

able is checked against the modes that the user has selected for processing. If **WorseMod**e is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

A special-case routine for checking the modes of the current science record against previous modes is performed for the creation of daily science plot files. The purpose of this routine is to use only the best data in the averaging interval. This is done by comparing the better mode of the current record with the best mode yet seen in the interval. If the better mode of the current record is worse than the best mode yet seen, then the record is marked as bad by setting the variable **GoodRec** to FALSE. If the better mode of the current record is better than the best mode yet seen, the statistics for the interval are cleared and processing continues. Figure 7-7 "AIF Mode Comparison" on page 7-13 shows the order by which modes are compared.

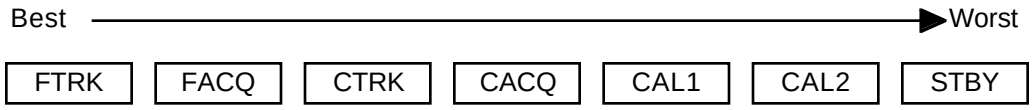

Figure 7-7 AIF Mode Comparison

If a record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval. If so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include a CAL step change, an End-of-File condition, or a difference between the worst mode of the averaging interval and the worst mode of the current record.

If the **WriteData** flag has been set, averages are computed for the current interval. RMS statistics are also computed using the Hayne method (see memo in Appendix F) of scaling the RMS of the height differences to compute Ku and C-band RMS. The **UseFlag** parameter is set to false if any of the following conditions are true:

- If the worst mode of the interval is not FTRK.
- the number of records used in the interval is less that one-half the total number of records in the averaging interval.
- the number of T1016 Data Quality Flags (**FlgAGC1016Ku** and **FlgAGC1016C** and **FlgSWH1016Ku** and **FlgSWH1016C** and **FlgHgt1016C** and **FlgHgt1016Ku** and **FlgHgtRate1016**) is greater than zero.
- the number of T5110 Waveform Flags (**FlgHi5110** and **FlgLo5110**) is greater than zero.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, several parameters of interest are computed using WFF Algorithms T1068 and T1016. A number of

flags returned by these algorithms are checked and counters are incremented if certain flags are set.

A special case check of T1016 Data Quality flags (**FlgAGC1016Ku** and **FlgAGC1016C** and **FlgSWH1016Ku** and **FlgSWH1016C** and **FlgHgt1016C** and **FlgHgt1016Ku** and **FlgHgtRate1016**) is performed for the creation of daily science plot files. If any one of these flags is set, the **GoodRec** flag is set to FALSE and the process returns.

Next, values of the primary science parameters are added to the statistics for the current interval, and WFF Algorithms T5110, T5135, and S5134 are run to compute several parameters of interest. Several flags generated by these algorithms are also checked and counted. At this point, **sciavg** is complete and returns. See Figure 7-8 "AIF sciavg Processing" on page 7-14 for a processing overview. See Appendix C for output file contents and formats.

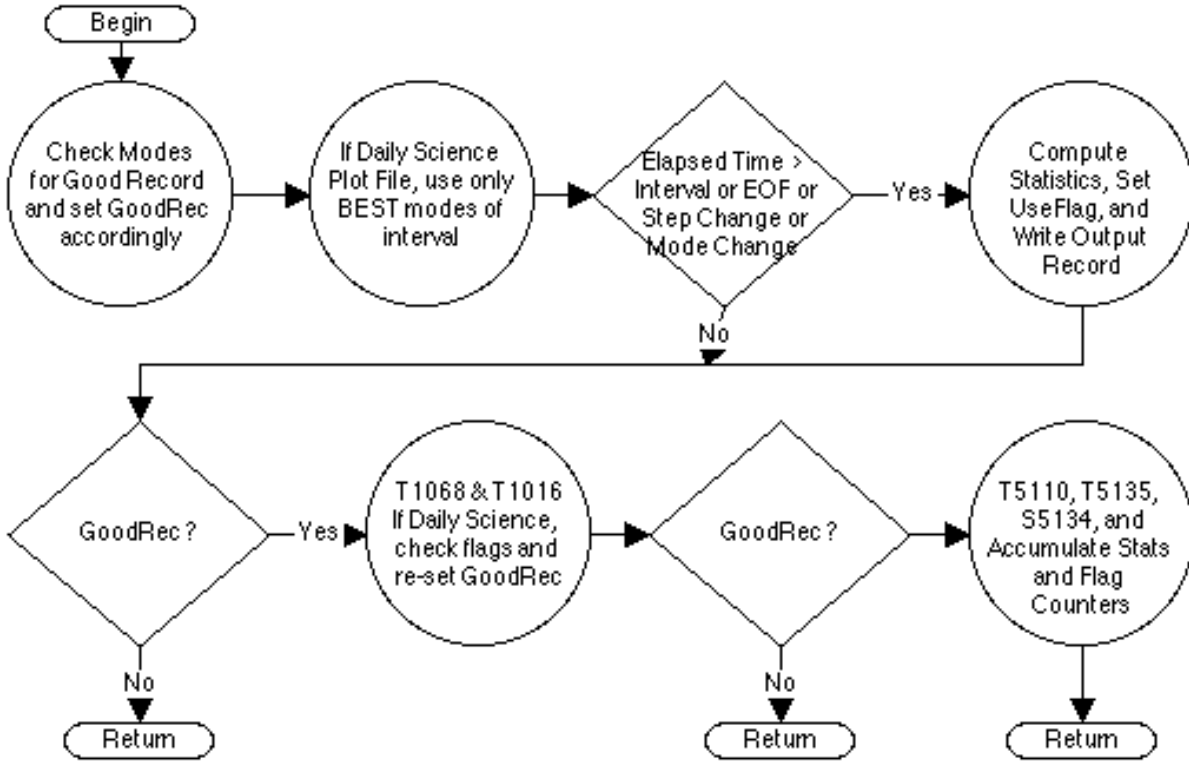

Figure 7-8 AIF sciavg Processing

7.1.12 dotelem:Average Engineering Data

The engineering data averaging routine, **engavg**, runs on a record-to-record basis and creates engineering average and database files. The module produces output records of the full-rate minimum, full-rate maximum, and interval average of engineering parameters.

The **engavg** processing begins with checking the mode of the current engineering record. The mode is checked against the modes that the user has selected for process-

ing. If the mode is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a GoodRec, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval; if so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include an End-of-File condition, or a mode change to/from CAL or IDLE.

If the **WriteData** flag has been set, averages are computed for the current interval and data are then written to the output file.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, the values of the primary engineering parameters are accumulated. Full-rate minimum and maximum values are checked and saved if necessary. At this point, **engavg** is complete and returns. See Figure 7-9 "AIF engavg Processing" on page 7-15 for a processing overview. See Appendix C for output file contents and formats.

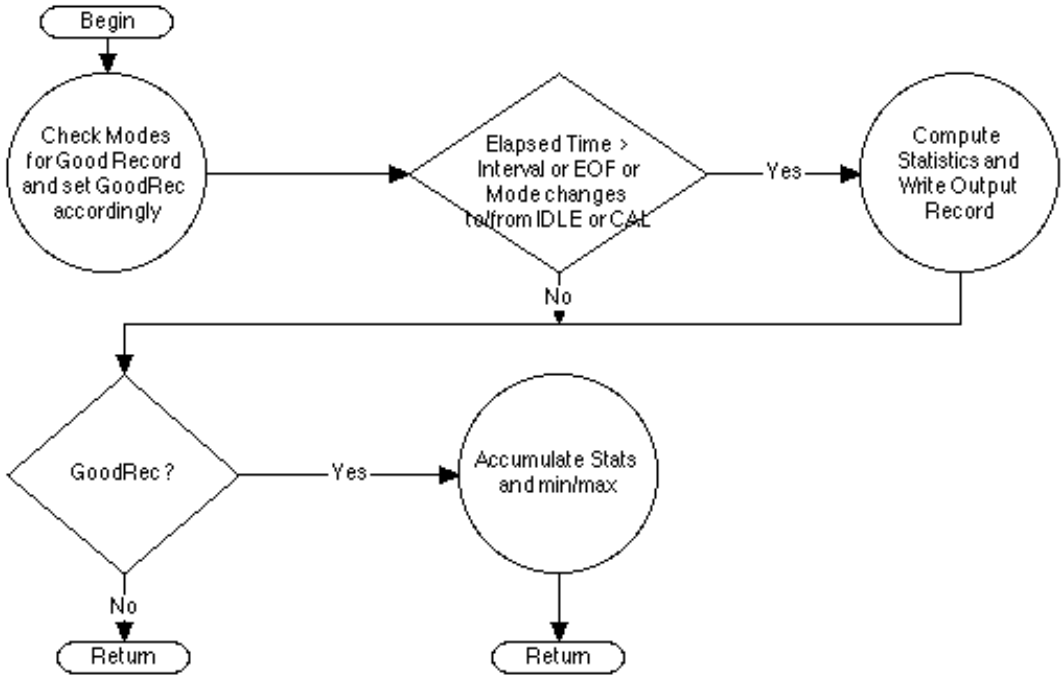

Figure 7-9 AIF engavg Processing

7.1.13 dotelem Waveform Averaging

The waveform averaging routine, **wfavg**, runs on a record-to-record basis and creates high and low rate waveform average files.

The **wfavg** processing begins with checking the mode of the current science record. The mode is checked against the modes that the user has selected for processing. If

the mode is not one of the user-selected modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a GoodRec, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval. If so, the **WriteData** flag is set. Other conditions which would set the **WriteData** flag include an End-of-File condition, a CAL step change, or a mode change.

If the **WriteData** flag has been set, averages are computed for the current interval and data are then written to the output files.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, the values of the standard waveform parameters are accumulated. At this point, **wfavg** is complete and returns. See Figure 7-10 "AIF wfavg Processing" on page 7-16 for a processing overview. See Appendix C for output file contents and formats.

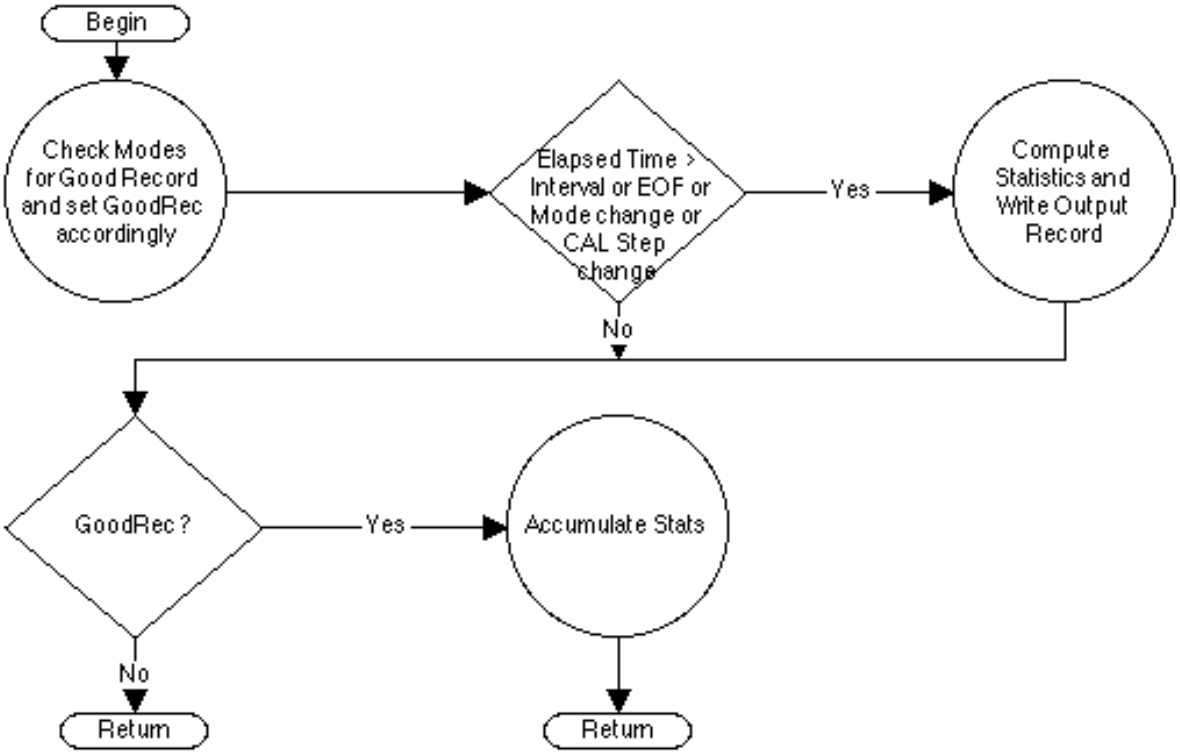

Figure 7-10 AIF wfavg Processing

7.1.14 dotelem Report Status Changes

The Report Status Changes routines, **scistatus** and **engstatus**, check for record-to-record differences in user-specified parameters and optionally compares memory dumps to **DataFile.ROMMap**, the reference memory map. Table 7-7 "Parameters Checked by Report Status Changes Options" on page 7-17 lists the parameters checked for each user-specified option.

Table 7-7 Parameters Checked by Report Status Changes Options

Option	Source	Parameters Checked
All Parameters	Science	**Status, Flags, Times, Commands, Memory,**
All Parameters	Engineering	**Status, Flags, Times, Commands, Memory,**
Status Bytes	Science	CALAttenKu, CALAttenC, SynchModeByte, ModeChangeByte, CurrModeByte, TestMode-Byte, OperModeByte, LimitByte, Mode, Track, AGCType, KuOn, COn, AltOper, WFFreqHi, WFFreqLo
Status Bytes	Engineering	EngMode, BiLevels, EngAltOper
Times	Science	Elapsed clock time, elapsed UTC time
Times	Engineering	Elapsed clock time, elapsed UTC time, Last Reset time.
Commands	Science	LastICACMD, LastATACMD
Commands	Engineering	LastCMDType, LastCMD, LastCMDStatus
Memory	Engineering	MemDumpAddr, MemDump, EngMemChkSum, Compare Memory
Database	Science	**Times**, **Commands**, KuOn, COn, AltOper, WFFreqHi, WFFreqLo
Database	Engineering	**Times**, **Commands**, Compare Memory, Mem-DumpAddr, EngMemChkSum, BiLevels
(Boldface parameters signify a group of individual parameters)		

7.1.15 dotelem calavg

The CAL mode processing routine, **calavg**, runs on a record-to-record basis and creates CAL average and database files. Reference CAL values are subtracted from the averages to compute deltas. **calavg** skips data at the beginning of each CAL mode and each CAL1 step to allow for settling, and temperature-corrects AGC data.

The **calavg** processing begins by checking the mode of the current science record. If the mode is not one of the CAL modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval, or more likely, if the CAL mode or Step has changed. If so, the **WriteData** flag is set.

If the **WriteData** flag has been set, averages are computed for the current interval and references subtracted from the averages. Data are then written to the output file. See Appendix D for the current CAL mode references.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, at the start of CAL1 or a Step change, one CAL record is skipped. At the start of CAL2, 9 records are skipped. If enough records have not been skipped, the process returns.

If sufficient records have been skipped, CAL1 AGC is CAL-Attenuator temperature-corrected and the values of the CAL parameters are accumulated. At this point, **calavg** is complete and returns. See Figure 7-11 "AIF calavg Processing" on page 7-18 for a processing overview. See Appendix C for output file contents and formats.

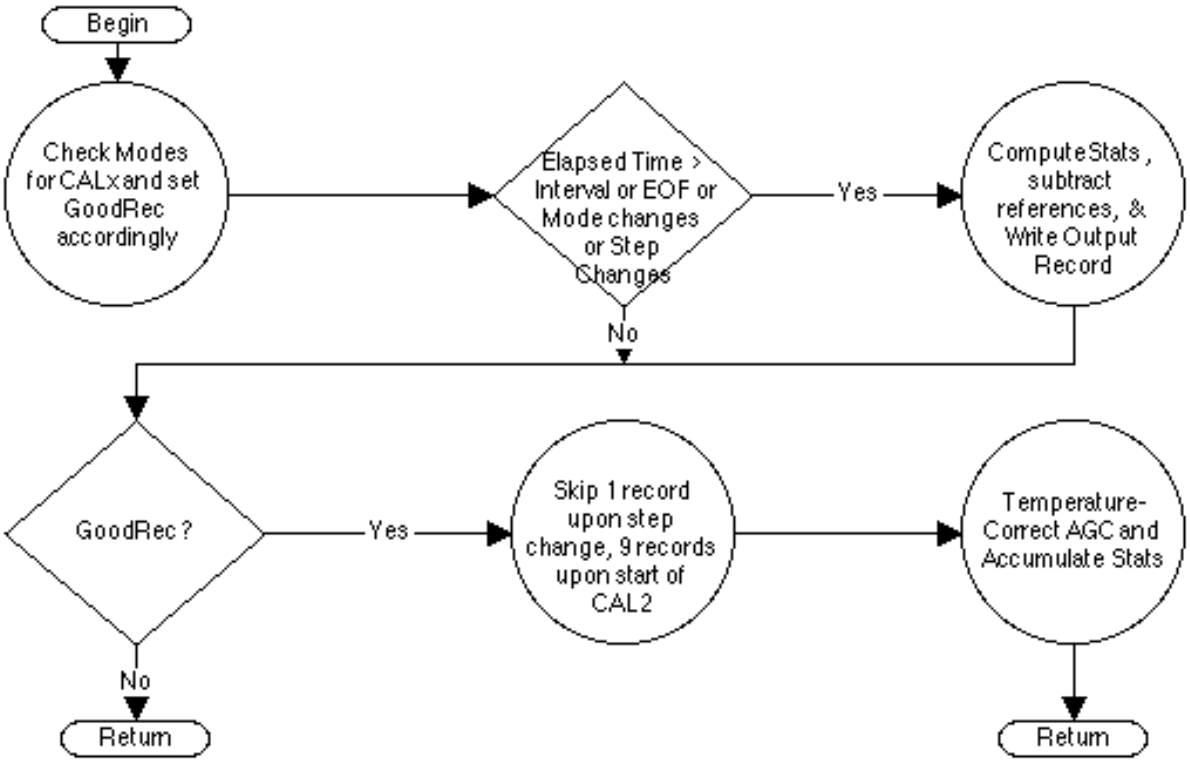

Figure 7-11 AIF calavg Processing

7.1.16 dotelem Create SDR

createsdr, the SDR creation routine, uses WFF Algorithms and some WFF-coded JPL Algorithms to create a pseudo-SDR. This is primarily used for algorithm testing and debugging purposes and is not an attempt to create an exact replica of an “official” JPL SDR. Table 7-8 "Algorithms Used in createsdr" on page 7-19 lists the algorithms used in the SDR creation process.

7.1.17 dotelem Check Waveforms

checkwf, the waveform checking routine, is used to determine if waveform shapes in CAL2 and STBY modes are changing. It does this by averaging waveforms in CAL2 and STBY, and subtracting a reference waveform from each average. The resulting deltas are then checked to see if there are values that exceed pre-set limits.

Table 7-8 Algorithms Used in createsdr

Algorithm	Developer	Implementation Notes
T4108	WFF	Complete Implementation.
T3107	WFF	Complete Implementation.
T3117	WFF	Complete Implementation.
T4109	JPL	Uses only WFF-Generated Variables.
T1068	WFF	Complete Implementation.
T1016	WFF	Complete Implementation.
T5110	WFF	Complete Implementation.
T5135	WFF	Complete Implementation.
T1165	WFF	Complete Implementation.
T1145	WFF	Complete Implementation.
T1155	WFF	Complete Implementation.

The **checkwf** processing begins by checking the mode of the current science record. If the mode is not CAL2 or STBY, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, if the mode has changed, the **WriteData** flag is set.

If the **WriteData** flag has been set, averages are computed for the current interval and references subtracted from the averages. The averages are checked against limits and alarm messages written if a limit is exceeded. Data are then written to the output file. See Appendix D for the current waveform reference and limits.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise at the start of CAL2, 9 records are skipped. If enough records have not been skipped, the process returns. One waveform (waveform, not record) is skipped if the Mode is STBY.

If sufficient records or waveforms have been skipped, the values of the waveform parameters are accumulated. If the mode is STBY, one-record averages are used. If the mode is CAL2, an average of the whole CAL2 interval is used. At this point, **checkwf** is complete and returns. See Appendix C for output file contents and formats.

7.1.18 dotelem Average CAL1 Waveforms

The CAL1 mode waveform averaging routine, **calwfmon**, runs on a record-to-record basis and creates CAL1 high and low rate waveform averages files. **Calwfmon** skips data at the beginning of each CAL1 step to allow for settling, and temperature-corrects AGC data.

The **calwfmon** processing begins by checking the mode of the current science record. If the mode is not one of the CAL modes, the record is marked as bad by setting the variable **GoodRec** to FALSE.

If this record is not a **GoodRec**, and there are no data in the current averaging interval, the module returns. Otherwise, elapsed time is checked to see if it exceeds the user-specified averaging interval, or more likely, if the CAL mode or Step has changed. If so, the **WriteData** flag is set, and averages are computed for the current interval.

If the **GoodRec** flag is set to FALSE, the process returns. Otherwise, at the start of CAL1 or a Step change, one CAL record is skipped.

If sufficient records have been skipped, CAL1 AGC is CAL-Attenuator temperature-corrected and the values of the CAL parameters are accumulated. At this point, **calwfmon** is complete and returns. See Figure 7-12 "Cal1 Waveform Averaging" on page 7-20 for a processing overview. See Appendix C for output file contents and formats.

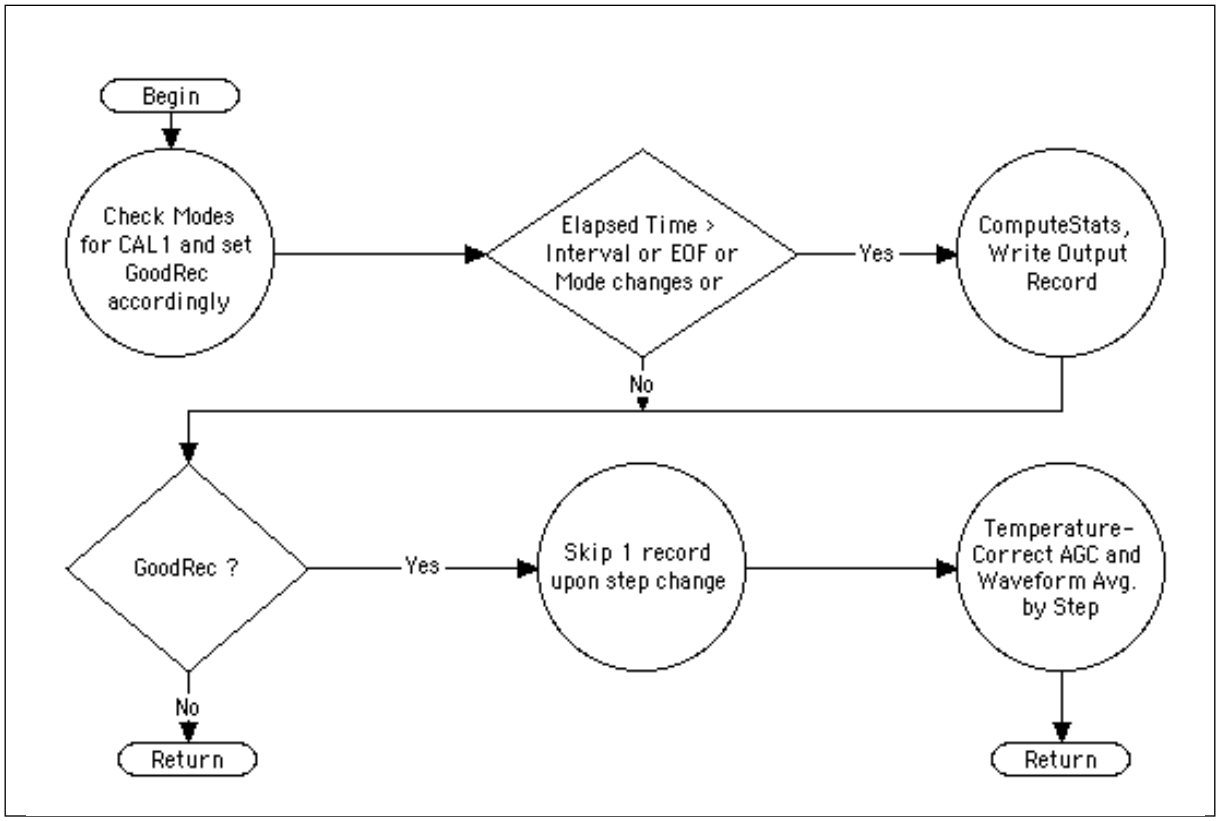

Figure 7-12 Cal1 Waveform Averaging

7.2 AIF Databases

FoxBase / Mac is used as the TOPEX AIF Database management system. The database Main Menu is depicted in Figure 7-13 "TOPEX AIF Database Main Menu" on page 7-21. Using this system, AIF data can be imported, exported, sorted, and searched. Spe-

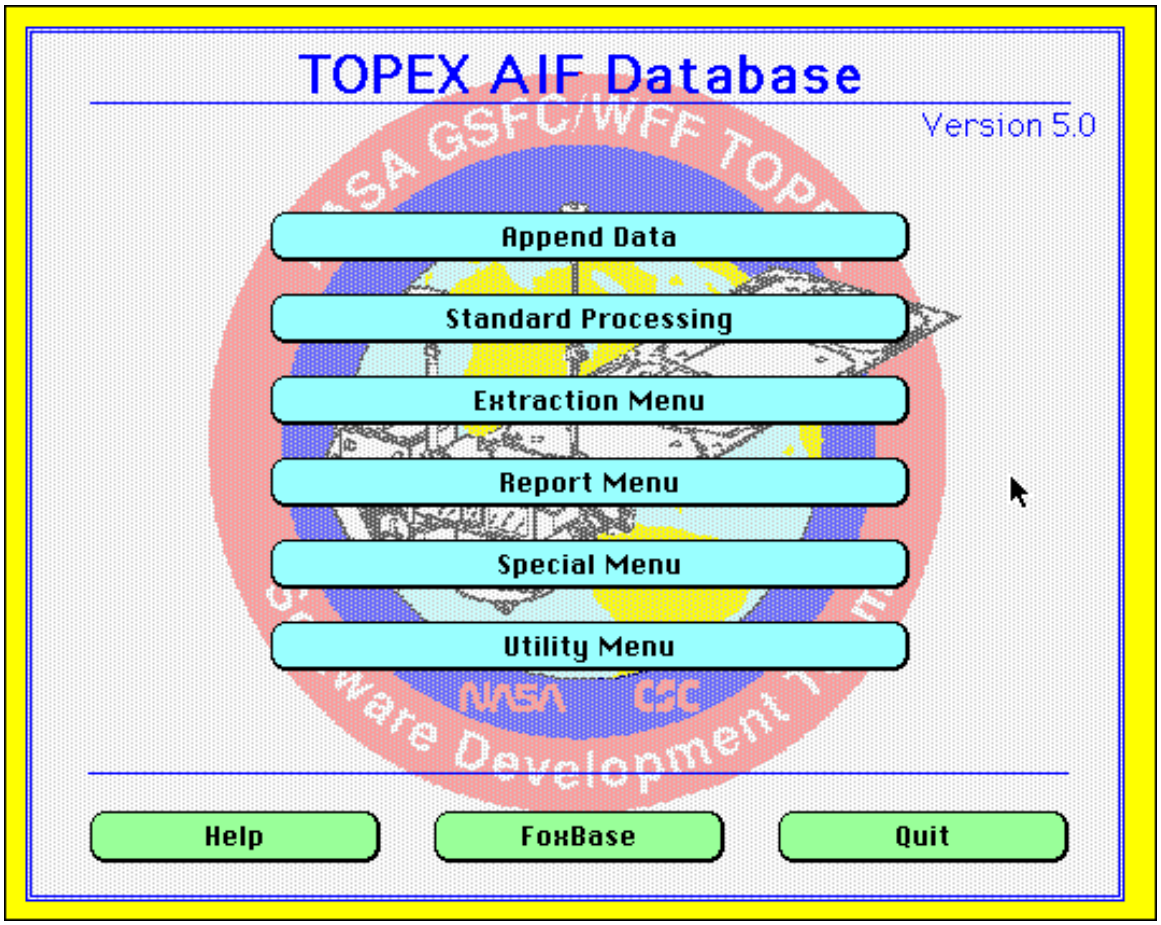

Figure 7-13 TOPEX AIF Database Main Menu

cial-purpose programs can be created to perform specific processing on the AIF data prior to exporting. Database structures are documented in Appendix C.

7.2.1 AIF Databases Append Data

Files created by the **dotelem** database processing routines are imported into and appended to the AIF databases. The Append Menu is shown in Figure 7-14 "AIF Database Append Menu" on page 7-22. Due to standard naming conventions, the user is prompted to pick one of the five import files. The database program then computes the other four filenames and checks for the existence of those files. If any of the five files are missing or misnamed, the import process is canceled. If all files exist, then the program imports the data from each file into the appropriate database. Table 7-9 "AIF Database Import Files" on page 7-22 lists the files required to import data.

7.2.2 AIF Databases Export Data

The AIF database system allows a user to extract data according to specified criteria. There are currently three extraction files available: Waveforms, CAL, and Engineering. The user may select from a range of dates and specific conditions to restrict the data extraction. The extraction files are written in the same format as the corresponding databases. See Appendix C for the database export file formats.

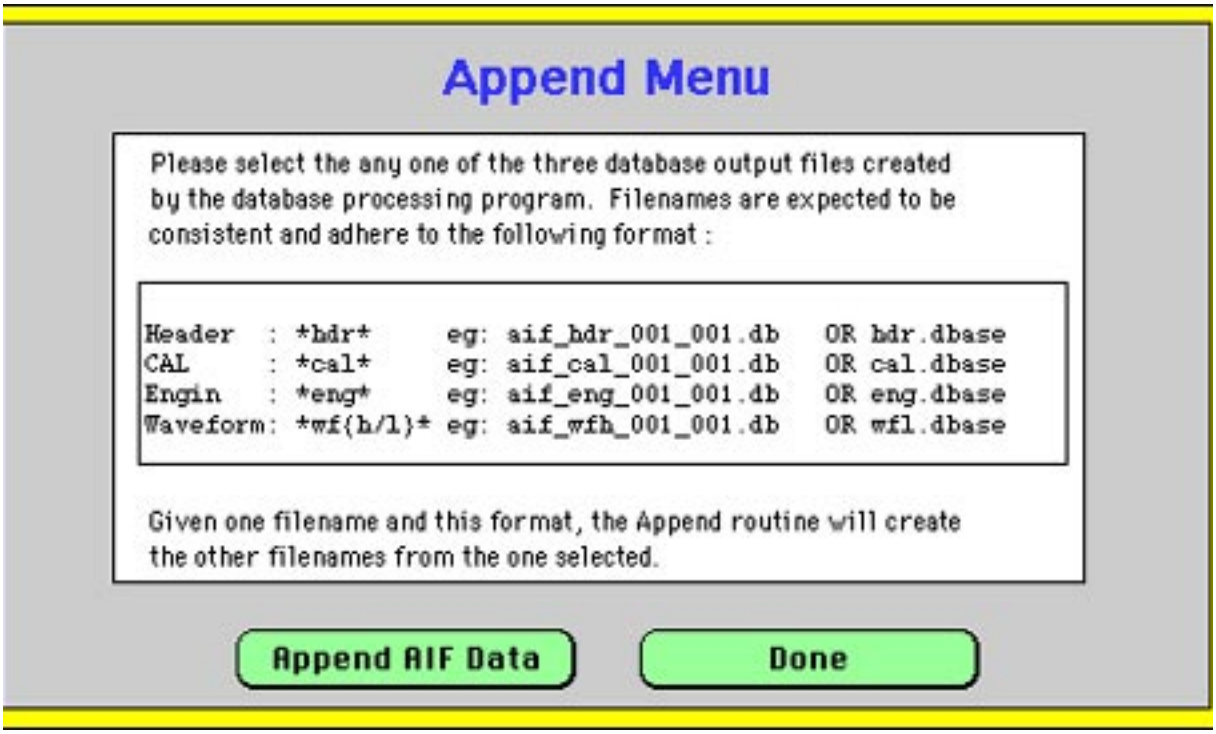

Figure 7-14 AIF Database Append Menu

Table 7-9 AIF Database Import Files

Std. Filename	Database	Description
cal.dbase	cal	Concatenated files of **dotelem** cal output.
hdr. dbase	header	Concatenated files of **dotelem** headers output.
eng. dbase	engin	Concatenated files of **dotelem** 1-hour engineering output
wfh.dbase	wfhi	Concatenated files of **dotelem** high rate checkwf output.
wfl.dbase	wflo	Concatenated files of **dotelem** low rate checkwf output.

7.2.3 AIF Cal1 Waveform Database

Files created by the **dotelem** standard processing routines are appended to the AIF Cal1 waveform database. See table for file content and format.Table C-11 “AIF Cal Waveform Monitor Database” Table 7-10 "AIF Cal Waveform Monitor Database Files" on page 7-23 lists the files required to import data.

Table 7-10 AIF Cal Waveform Monitor Database Files

Std. Filename	Database	Description
calwfmonhi.dbase	calwfmonhi	Concatenated files of **dotelem** high rate Cal1 wf output.
calwfmonlo.dbase	calwfmonlo	Concatenated files of **dotelem** low rate Cal1 wf output.

7.3 AIF IDL Software

IDL, Interactive Data Language, is a software package written by Research Systems, Inc. It is an array-based scientific visualization package that enables a programmer to quickly and easily write code to generate highly customized plots and analyses. IDL has allowed the TOPEX SWDT to automatically generate products that were difficult and time-consuming to produce using COTS software.

TOPEX IDL programs generally can read **dotelem** average files or database export files and produce standardized plots on a PostScript printer. These programs are coded with a set of parameters which may be modified to customize features of the final output without changing the IDL code. Table 7-11 "IDL Parameters" on page 7-23 lists the standard parameters that may be modified by the user. Appendix B lists the UNIX scripts which run TOPEX IDL programs.

Table 7-11 IDL Parameters

Parameter	Default	Description
InputFile	n/a	Text file from which data to be processed is read.
XPlots	varies	Number of plots stacked horizontally per page.
YPlots	varies	Number of plots stacked vertically per page.
Printer	topex2	Printer where output will be printed.
AutoScale	FALSE	Switch to automatically set axis scales by min & max of data, rather than by standard scale values.
LandScape	varies	Switch to print in landscape rather than portrait mode.
DeviceType	‘ps’	Type of device driver to use (ps=PostScript).
PlotTitle	*InputFile*	Title to place on plot. May be overridden by program.
Color	TRUE	Switch to define that color should be used for output.
Scale	1.0	Factor by which to scale whole page. Useful for incorporating output in presentations or publications.
Manual	FALSE	Switch to define that printer should be set to Manual Feed mode. Highly printer-dependent.
All	FALSE	Switch to define that all output products should be printed rather than the standard subset. Used by only some programs.
SinceLast	TRUE	Switch to define that output data should be subsetted by a pre-defined interval. Useful for restricting Launch-to-Date output.

7.4 UNIX Scripts

UNIX scripts are used to automate common tasks and supply standard parameters to TOPEX AIF software. Some shell scripts are invoked by the **crontab** facility to per-

form daily processing. Other shell scripts are used for automatically retrieving and processing special data from JPL, automatically running IDL programs, and miscellaneous utility functions. Appendix B contains a list of UNIX scripts which are available for use.

Appendix A
Standard Products

This appendix contains samples of the standard products produced by the TOPEX AIF software. A note is made, where appropriate, detailing the frequency of production of the product.

```
csh /gen/topex2/bin/autoaif

produced the following output:

Tue May 3 03:00:11 EDT 1994 -- starting JPL automatic copying..
wffdev:[wffuser.wff_data]tcc_alteng_1994122t000000.bin copied.  Retrys : 1
wffdev:[wffuser.wff_data]tcc_altsci_1994122t000000.bin copied.  Retrys : 1
wffdev:[wffuser.wff_data]tcc_wff1_1994122t000000.bin copied.  Retrys : 1

Tue May 3 03:44:59 EDT 1994 -- running dotelem...

Tue May 3 03:59:01 EDT 1994 -- moving tcc_wff1_1994122t000000.bin to /gen/flight/aif

Tue May 3 03:59:04 EDT 1994 -- Printing IDL Hdr Page...

Tue May 3 03:59:18 EDT 1994 -- Printing IDL CAL plots...

Tue May 3 03:59:21 EDT 1994 -- Printing IDL Science plots...
Tue May 3 04:00:01 EDT 1994 -- Printing IDL Engineering plots...
Tue May 3 04:00:13 EDT 1994 -- Printing IDL Waveform plots...

Tue May 3 04:00:20 EDT 1994 -- Printing events...
request id is topex-115 (1 file(s))
Tue May 3 04:01:29 EDT 1994 -- Automatic Processing Complete.

-- See jplauto_1994122t000000.log for more details. --
```

Figure A-1 AIF Processing Log Produced as Part of Daily Processing

TOPEX Daily AIF Summary Information

Header ID:	0
Day Number:	1994121
Alt:	A
KuOn:	ON
COn:	C32
Date Processed:	05/02/94
WFF Program:	doTelem
WFF Version:	3.5,01/25/94
TelemConst Version:	13,05/11/93
EALimits Version:	07,01/26/94
ROMMap Version:	1.3,12/08/93
Bad Eng Records:	7
Bad Sci Records:	27
Hours in TRACK:	23.84
Sci Data Lost (sec):	26.8
Eng Data Lost (sec):	49.1
Last RST, # RSTs:	31D99295124E,0
STBYWF Alarms(Hi,Lo):	3,0
CAL2WF Alarms(Hi,Lo):	4,3

Figure A-2 AIF Processing Summary Produced as Part of Daily Processing

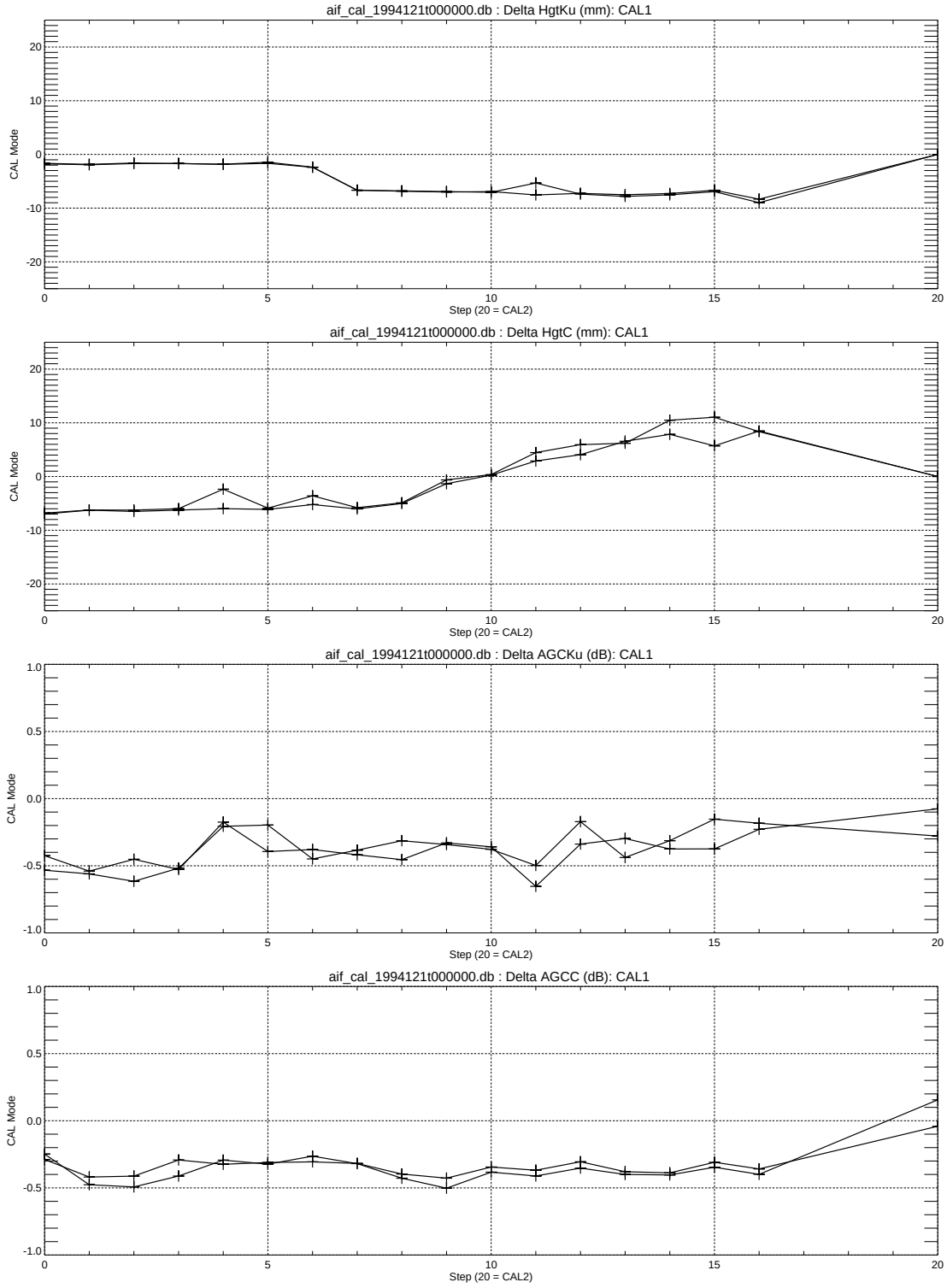

Figure A-3 AIF CAL Plot Produced as Part of Daily Processing

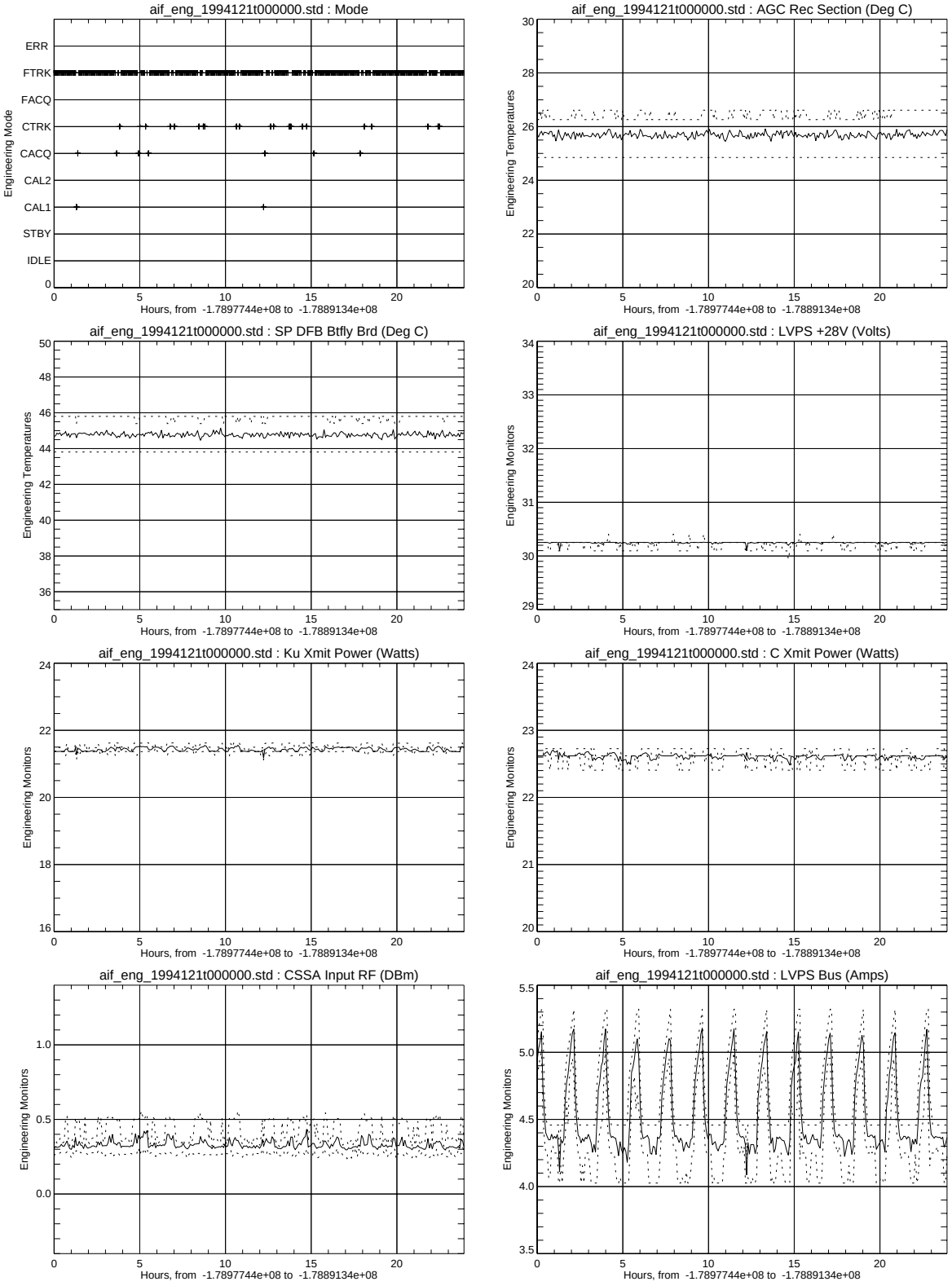

Figure A-4 AIF Engineering Plot Produced as Part of Daily Processing

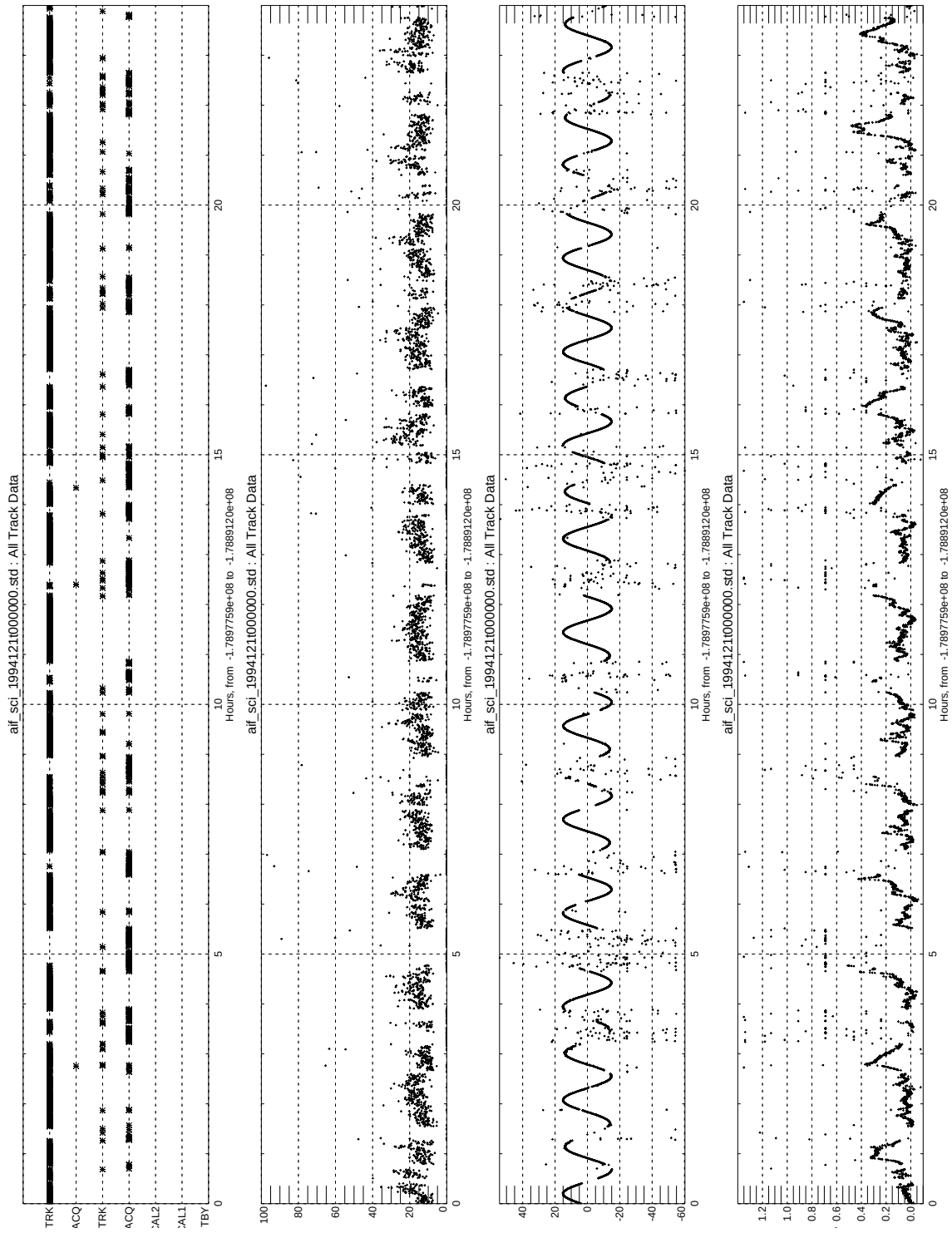

Figure A-5 AIF Science Plots Produced as Part of Daily Processing

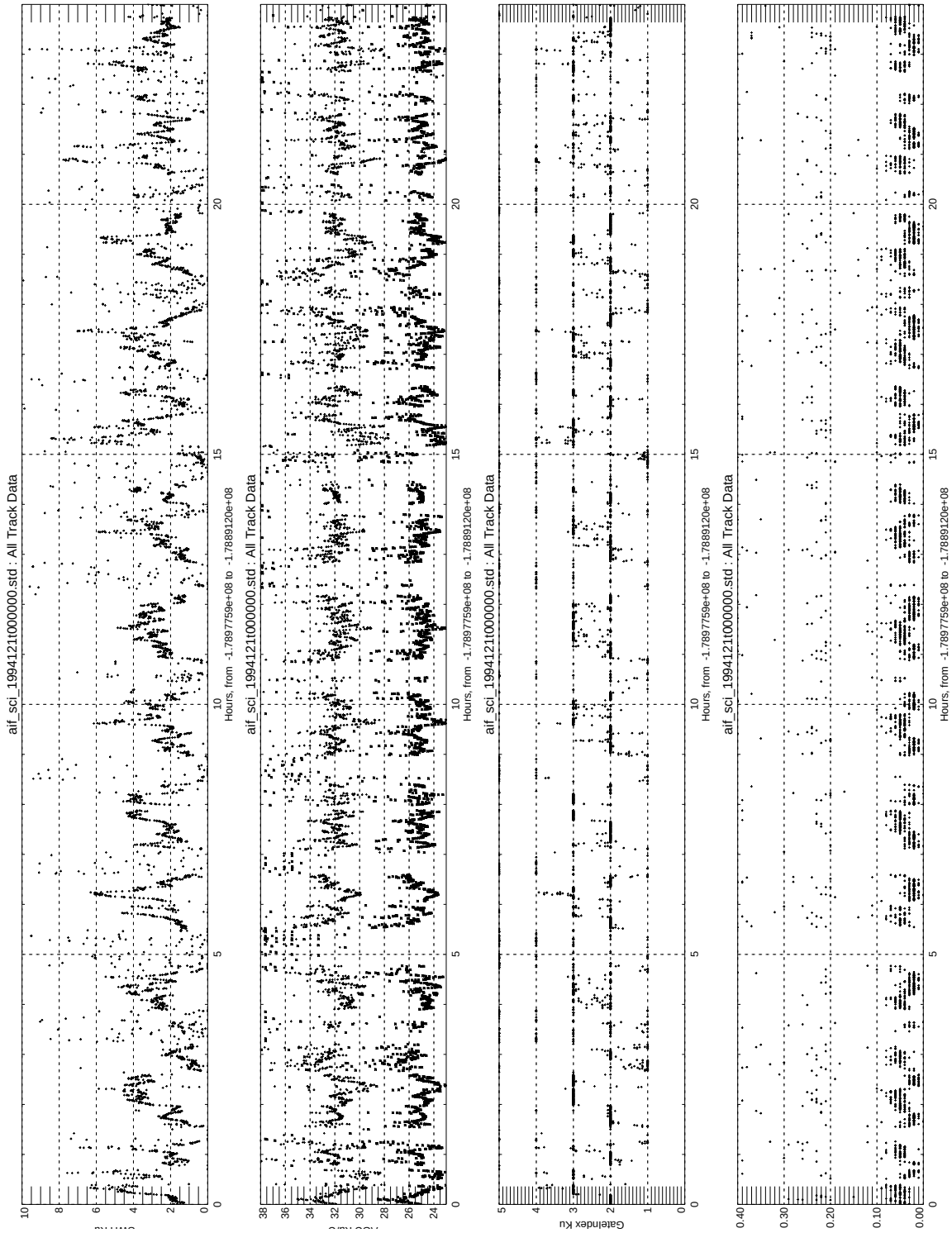

Figure A-5 AIF Science Plots Produced as Part of Daily Processing (Continued)

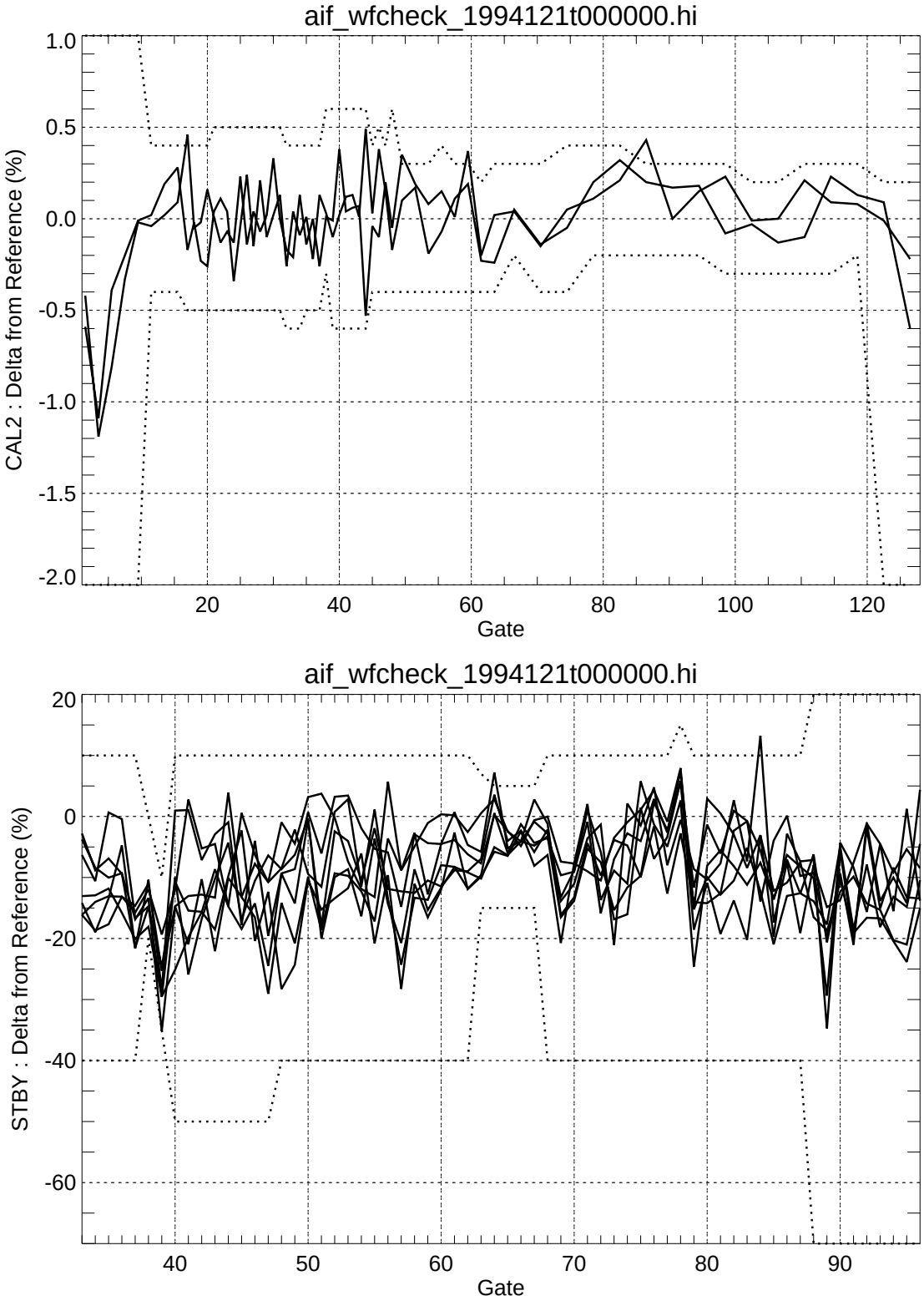

Figure A-6 AIF Waveforms Difference Plot Produced as Part of Daily Processing

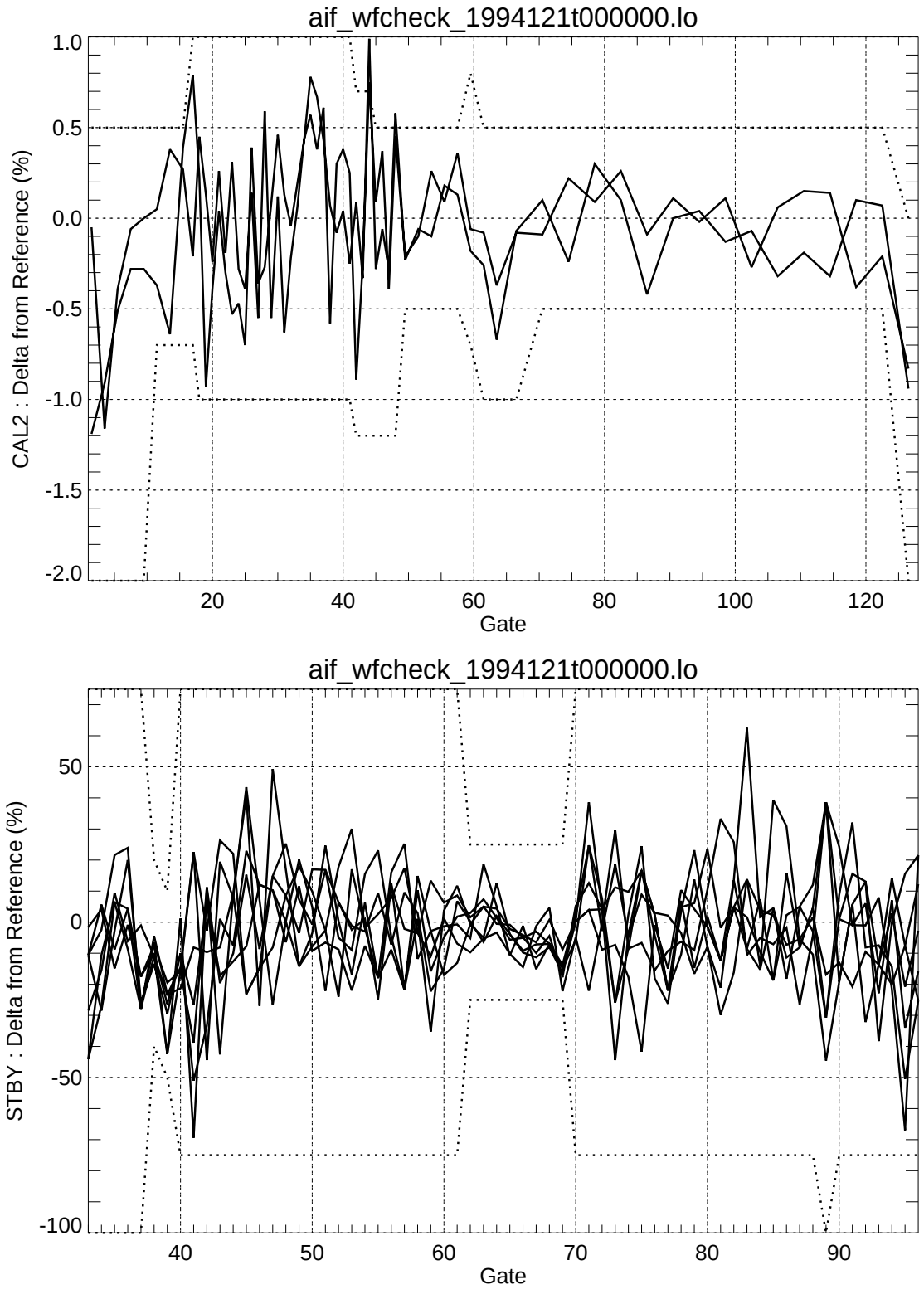

Figure A-6 AIF Waveforms Difference Plot Produced as Part of Daily Processing (Continued)

Figure A-7 AIF Events Report Produced as Part of Daily Processing

```
--------------------------------------------------------------------------------
1994121 -178977599.55 1994-121T00:00:00 SCI   Mode          Mode(1,2) FTRK,FTRK
--------------------------------------------------------------------------------
1994121 -178977586.17 1994-121T00:00:14 ENG  dTime     Time_Last_Reset   53525914.95
1994121 -178977586.17 1994-121T00:00:14 ENG  dTime  Time_Last_Reset_Hex 31D99295124E
--------------------------------------------------------------------------------
1994121 -178977553.40 1994-121T00:00:47 ENG Status         BadEngRecs           1
--------------------------------------------------------------------------------
1994121 -178977539.52 1994-121T00:01:00 SCI Status         BadSciRecs           1
1994121 -178977539.52 1994-121T00:01:00 SCI  dTime        Sci_Time_SDF         2.15
1994121 -178977539.52 1994-121T00:01:00 SCI  dTime        Sci_Time_UTC         2.11
--------------------------------------------------------------------------------
1994121 -178977537.02 1994-121T00:01:03 ENG  dTime        Eng_Time_EDF         17.16
1994121 -178977537.02 1994-121T00:01:03 ENG  dTime        Eng_Time_UTC         16.38
--------------------------------------------------------------------------------
1994121 -178972859.39 1994-121T01:19:01 ENG    CMD     Last_Command(1) ICA  AWENBLK1 OK
1994121 -178972859.39 1994-121T01:19:01 ENG    CMD     Last_Command(4) ATAs STANDBY  OK
1994121 -178972859.39 1994-121T01:19:01 ENG    CMD     Last_Command(5) ATAs CAL      OK
1994121 -178972859.39 1994-121T01:19:01 ENG    CMD     Last_Command(7) ICA  AFULLON  OK
1994121 -178972859.39 1994-121T01:19:01 ENG Memory  ENG_Memory_CheckSum BDD5
--------------------------------------------------------------------------------
1994121 -178972855.80 1994-121T01:19:04 SCI   Mode          Mode(1,2) STBY,STBY
--------------------------------------------------------------------------------
1994121 -178972854.78 1994-121T01:19:05 SCI   Mode          Mode(1,2) CAL1,CAL1
--------------------------------------------------------------------------------
1994121 -178972851.20 1994-121T01:19:09 ENG Memory  ENG_Memory_CheckSum 5CE9
--------------------------------------------------------------------------------
1994121 -178972678.08 1994-121T01:22:02 SCI   Mode          Mode(1,2) CAL2,CAL2
--------------------------------------------------------------------------------
1994121 -178972613.63 1994-121T01:23:06 ENG    CMD     Last_Command(1) ICA  AWENBLK1 OK
1994121 -178972613.63 1994-121T01:23:06 ENG    CMD     Last_Command(4) ATAs STANDBY  OK
1994121 -178972613.63 1994-121T01:23:06 ENG    CMD     Last_Command(6) ATAs TRACK    OK
1994121 -178972613.63 1994-121T01:23:06 ENG    CMD     Last_Command(7) ICA  AFULLON  OK
1994121 -178972613.63 1994-121T01:23:06 ENG Memory  ENG_Memory_CheckSum 5CF5
--------------------------------------------------------------------------------
1994121 -178972610.94 1994-121T01:23:09 SCI   Mode          Mode(1,2) STBY,STBY
1994121 -178972640.37 1994-121T01:22:40 WF  CAL2LO Gate  44 Upper   0.7     0.99
1994121 -178972640.37 1994-121T01:22:40 WF  CAL2LO Gate  48 Upper   0.5     0.58
--------------------------------------------------------------------------------
1994121 -178972608.83 1994-121T01:23:11 SCI   Mode          Mode(1,2) CACQ,CACQ
--------------------------------------------------------------------------------
1994121 -178948750.33 1994-121T08:00:50 ENG Status         BadEngRecs           1
--------------------------------------------------------------------------------
1994121 -178948739.83 1994-121T08:01:00 SCI Status         BadSciRecs           1
1994121 -178948739.83 1994-121T08:01:00 SCI  dTime        Sci_Time_SDF         2.17
1994121 -178948739.83 1994-121T08:01:00 SCI  dTime        Sci_Time_UTC         2.18
--------------------------------------------------------------------------------
1994121 -178948733.95 1994-121T08:01:06 ENG  dTime        Eng_Time_EDF         16.27
1994121 -178948733.95 1994-121T08:01:06 ENG  dTime        Eng_Time_UTC         16.38
--------------------------------------------------------------------------------
1994121 -178937723.90 1994-121T11:04:36 ENG Status         BadEngRecs           1
--------------------------------------------------------------------------------
1994121 -178937707.64 1994-121T11:04:52 SCI Status         BadSciRecs           1
1994121 -178937707.64 1994-121T11:04:52 SCI  dTime        Sci_Time_SDF         2.15
1994121 -178937707.64 1994-121T11:04:52 SCI  dTime        Sci_Time_UTC         2.18
--------------------------------------------------------------------------------
1994121 -178937707.51 1994-121T11:04:52 ENG  dTime        Eng_Time_EDF         16.12
1994121 -178937707.51 1994-121T11:04:52 ENG  dTime        Eng_Time_UTC         16.38
```

Figure A-7 AIF Events Report Produced as Part of Daily Processing (Continued)

```
1994121 -178933562.36 1994-121T12:13:58 ENG    CMD      Last_Command(4) ICA  AWENBLK1 OK
1994121 -178933562.36 1994-121T12:13:58 ENG    CMD      Last_Command(6) ATAs STANDBY  OK
1994121 -178933562.36 1994-121T12:13:58 ENG    CMD      Last_Command(8) ATAs CAL      OK
1994121 -178933562.36 1994-121T12:13:58 ENG Memory  ENG_Memory_CheckSum BDD5
--------------------------------------------------------------------------------
1994121 -178933556.67 1994-121T12:14:03 SCI   Mode           Mode(1,2) STBY,STBY
1994121 -178933556.67 1994-121T12:14:03 WF  STBYHI Gate  84 Upper  10.0    13.22
1994121 -178933555.64 1994-121T12:14:04 WF  STBYHI Gate  64 Upper   5.0     7.21
--------------------------------------------------------------------------------
1994121 -178933554.62 1994-121T12:14:05 SCI   Mode           Mode(1,2) CAL1,CAL1
--------------------------------------------------------------------------------
1994121 -178933554.17 1994-121T12:14:06 ENG    CMD      Last_Command(2) ICA  AFULLON  OK
1994121 -178933554.17 1994-121T12:14:06 ENG Memory  ENG_Memory_CheckSum 5CE9
--------------------------------------------------------------------------------
1994121 -178933377.98 1994-121T12:17:02 SCI   Mode           Mode(1,2) CAL2,CAL2
--------------------------------------------------------------------------------
1994121 -178933316.60 1994-121T12:18:03 ENG    CMD      Last_Command(4) ICA  AWENBLK1 OK
1994121 -178933316.60 1994-121T12:18:03 ENG    CMD      Last_Command(7) ATAs STANDBY  OK
1994121 -178933316.60 1994-121T12:18:03 ENG Memory  ENG_Memory_CheckSum BDD5
--------------------------------------------------------------------------------
1994121 -178933310.78 1994-121T12:18:09 SCI   Mode           Mode(1,2) STBY,STBY
1994121 -178933340.24 1994-121T12:17:40 WF  CAL2HI Gate  17 Upper   0.4     0.46
1994121 -178933340.24 1994-121T12:17:40 WF  CAL2LO Gate  44 Upper   0.7     0.75
1994121 -178933340.24 1994-121T12:17:40 WF  CAL2HI Gate  49 Upper   0.3     0.35
1994121 -178933340.24 1994-121T12:17:40 WF  CAL2HI Gate  59 Upper   0.3     0.37
1994121 -178933340.24 1994-121T12:17:40 WF  CAL2HI Gate  85 Upper   0.3     0.43
1994121 -178933310.78 1994-121T12:18:09 WF  STBYHI Gate  39 Lower -35.0   -35.18
--------------------------------------------------------------------------------
1994121 -178933308.73 1994-121T12:18:11 SCI   Mode           Mode(1,2) CACQ,CACQ
--------------------------------------------------------------------------------
1994121 -178933308.41 1994-121T12:18:12 ENG    CMD      Last_Command(1) ATAs TRACK    OK
1994121 -178933308.41 1994-121T12:18:12 ENG    CMD      Last_Command(2) ATAs $ C00F7B OK
1994121 -178933308.41 1994-121T12:18:12 ENG    CMD      Last_Command(3) ICA  AFULLON  OK
1994121 -178933308.41 1994-121T12:18:12 ENG Memory  ENG_Memory_CheckSum 5CF5
--------------------------------------------------------------------------------
1994121 -178931809.27 1994-121T12:43:11 ENG Status         BadEngRecs           1
--------------------------------------------------------------------------------
1994121 -178931793.34 1994-121T12:43:27 SCI Status         BadSciRecs           1
1994121 -178931793.34 1994-121T12:43:27 SCI  dTime         Sci_Time_SDF         2.17
1994121 -178931793.34 1994-121T12:43:27 SCI  dTime         Sci_Time_UTC         2.18
--------------------------------------------------------------------------------
----------------------------------
1994121 -178931792.89 1994-121T12:43:27 ENG  dTime         Eng_Time_EDF         16.24
1994121 -178931792.89 1994-121T12:43:27 ENG  dTime         Eng_Time_UTC         16.38
--------------------------------------------------------------------------------
1994121 -178924770.81 1994-121T14:40:29 SCI Status         BadSciRecs           9
1994121 -178924770.81 1994-121T14:40:29 SCI  dTime         Sci_Time_SDF         10.02
1994121 -178924770.81 1994-121T14:40:29 SCI  dTime         Sci_Time_UTC         10.05
--------------------------------------------------------------------------------
1994121 -178924766.78 1994-121T14:40:33 SCI Status         BadSciRecs           3
1994121 -178924766.78 1994-121T14:40:33 SCI  dTime         Sci_Time_SDF         3.95
1994121 -178924766.78 1994-121T14:40:33 SCI  dTime         Sci_Time_UTC         4.03
--------------------------------------------------------------------------------
1994121 -178924759.67 1994-121T14:40:40 SCI Status         BadSciRecs           6
1994121 -178924759.67 1994-121T14:40:40 SCI  dTime         Sci_Time_SDF         6.90
1994121 -178924759.67 1994-121T14:40:40 SCI  dTime         Sci_Time_UTC         7.10
```

Figure A-7 AIF Events Report Produced as Part of Daily Processing (Continued)

```
-------------------------------------------------------------
1994121 -178924758.71 1994-121T14:40:41 SCI  dTime       Sci_Time_UTC       0.96
-------------------------------------------------------------------------------
1994121 -178924755.64 1994-121T14:40:44 SCI Status        BadSciRecs         2
1994121 -178924755.64 1994-121T14:40:44 SCI  dTime       Sci_Time_SDF       3.23
1994121 -178924755.64 1994-121T14:40:44 SCI  dTime       Sci_Time_UTC       3.07
-------------------------------------------------------------------------------
1994121 -178919955.45 1994-121T16:00:45 ENG Status        BadEngRecs         1
-------------------------------------------------------------------------------
1994121 -178919939.83 1994-121T16:01:00 SCI Status        BadSciRecs         1
1994121 -178919939.83 1994-121T16:01:00 SCI  dTime       Sci_Time_SDF       2.15
1994121 -178919939.83 1994-121T16:01:00 SCI  dTime       Sci_Time_UTC       2.18
-------------------------------------------------------------------------------
1994121 -178919939.07 1994-121T16:01:01 ENG  dTime       Eng_Time_EDF       16.11
1994121 -178919939.07 1994-121T16:01:01 ENG  dTime       Eng_Time_UTC       16.38
-------------------------------------------------------------------------------
1994121 -178910755.83 1994-121T18:34:04 ENG Status        BadEngRecs         1
-------------------------------------------------------------------------------
1994121 -178910747.13 1994-121T18:34:13 SCI Status        BadSciRecs         1
1994121 -178910747.13 1994-121T18:34:13 SCI  dTime       Sci_Time_SDF       2.15
1994121 -178910747.13 1994-121T18:34:13 SCI  dTime       Sci_Time_UTC       2.11
-------------------------------------------------------------------------------
1994121 -178910739.45 1994-121T18:34:2
----------------------1 ENG  dTime       Eng_Time_EDF       16.12
1994121 -178910739.45 1994-121T18:34:21 ENG  dTime       Eng_Time_UTC       16.38
-------------------------------------------------------------------------------
1994121 -178891209.72 1994-121T23:59:50 ENG Status        BadEngRecs         1
-------------------------------------------------------------------------------
1994121 -178891200.38 1994-122T00:00:00 SCI  TOTAL       BadSciRecs         27
-------------------------------------------------------------------------------
1994121 -178891209.72 1994-121T23:59:50 ENG  TOTAL       BadEngRecs         7
```

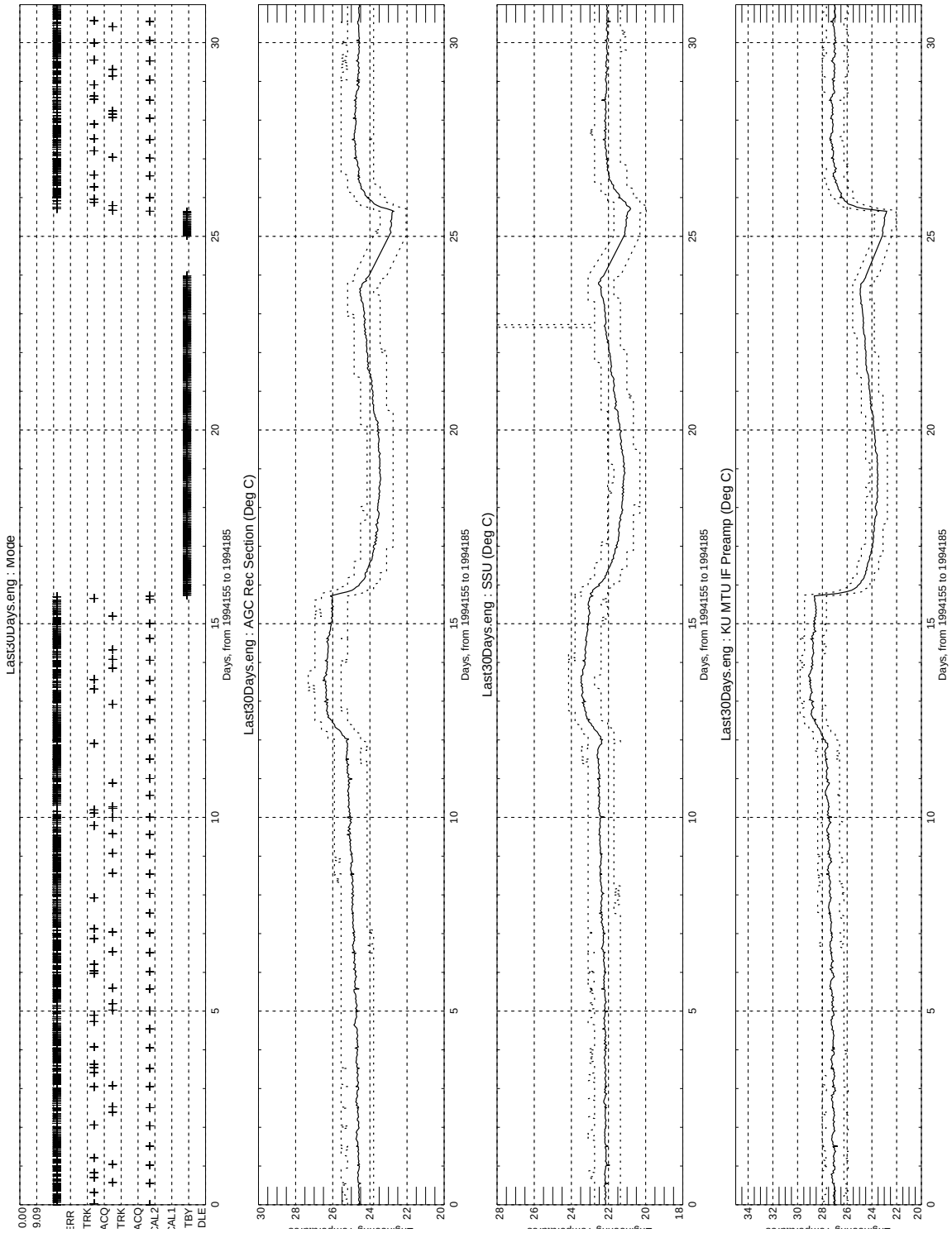

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing

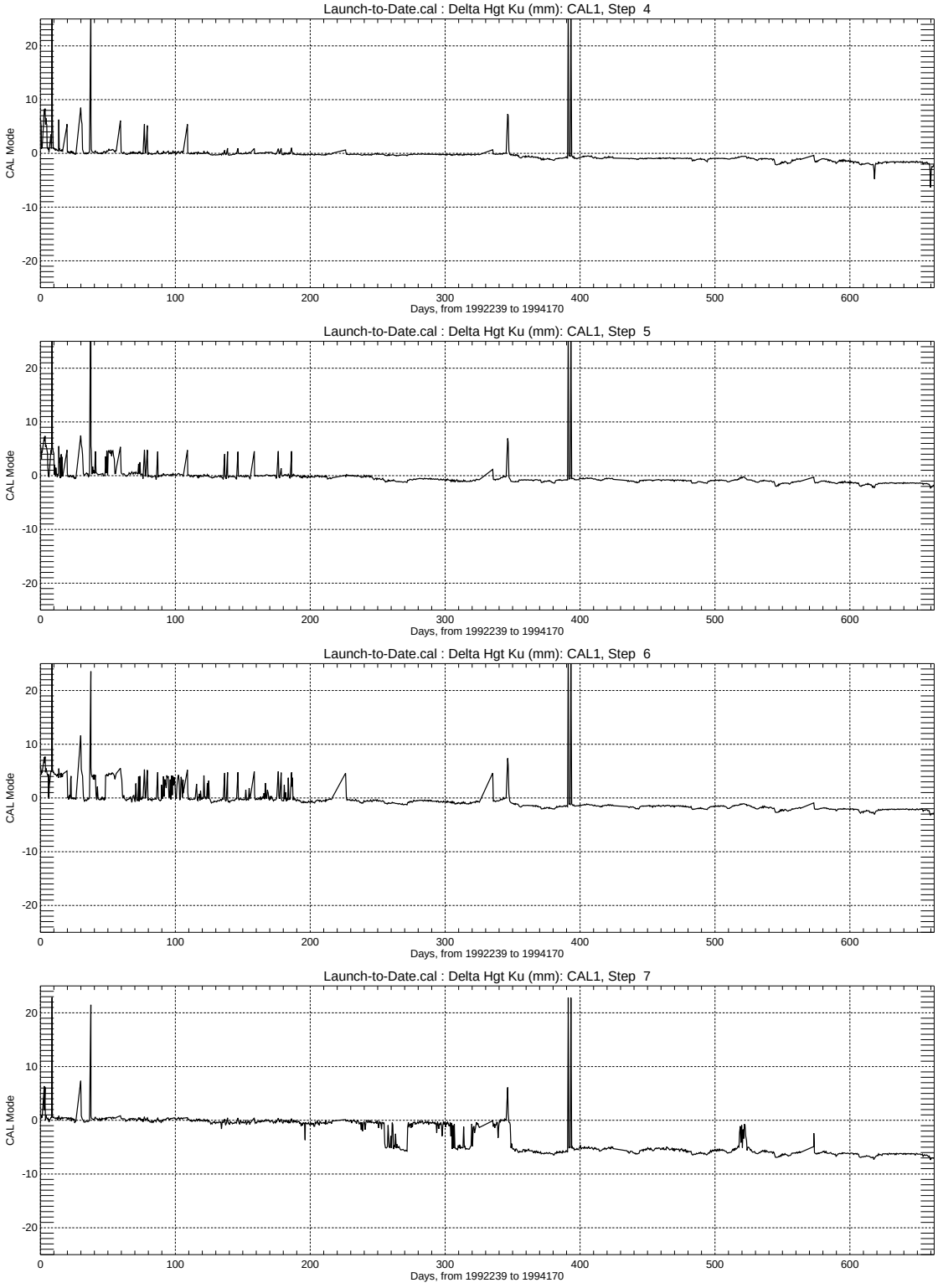

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

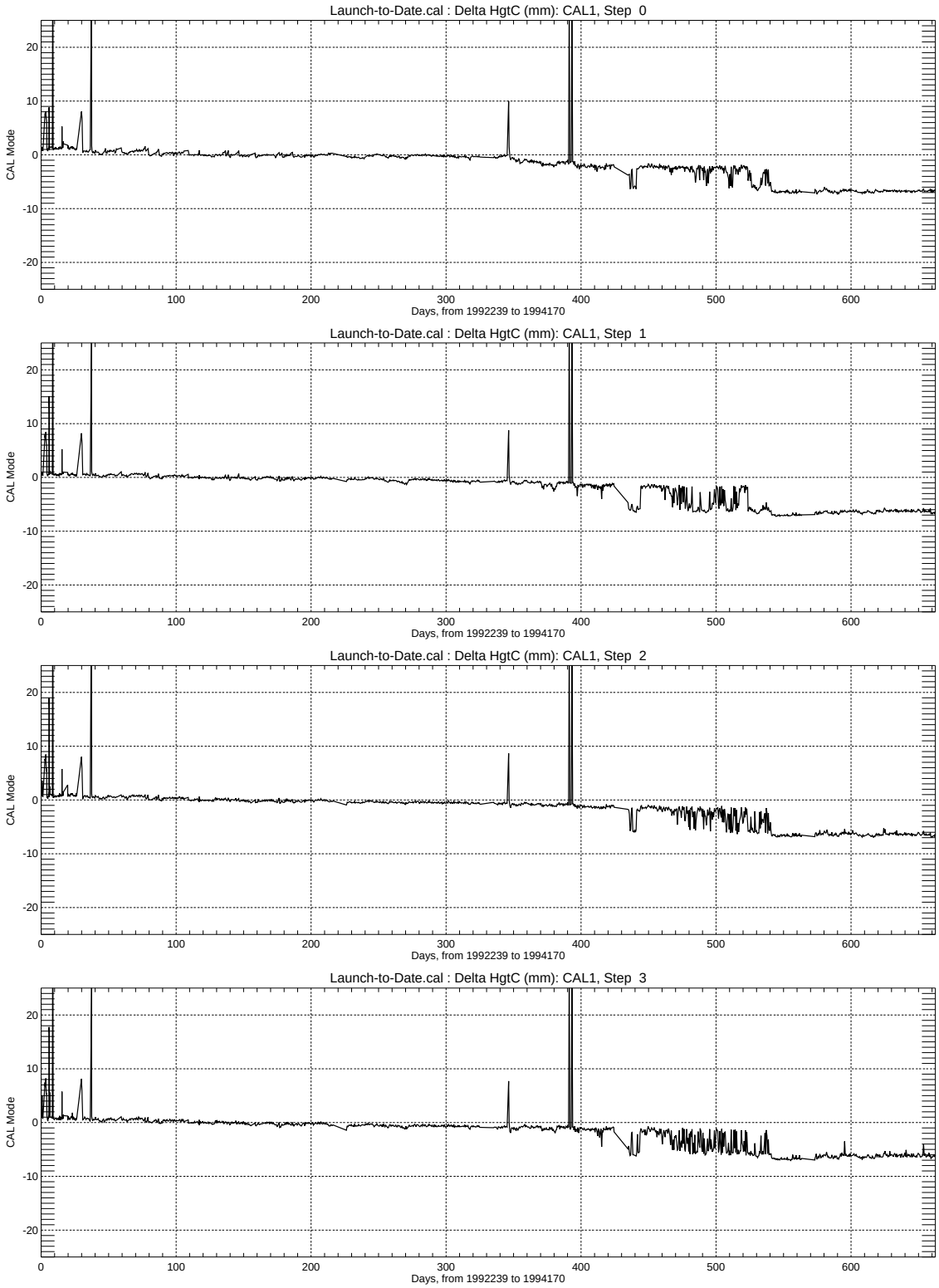

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

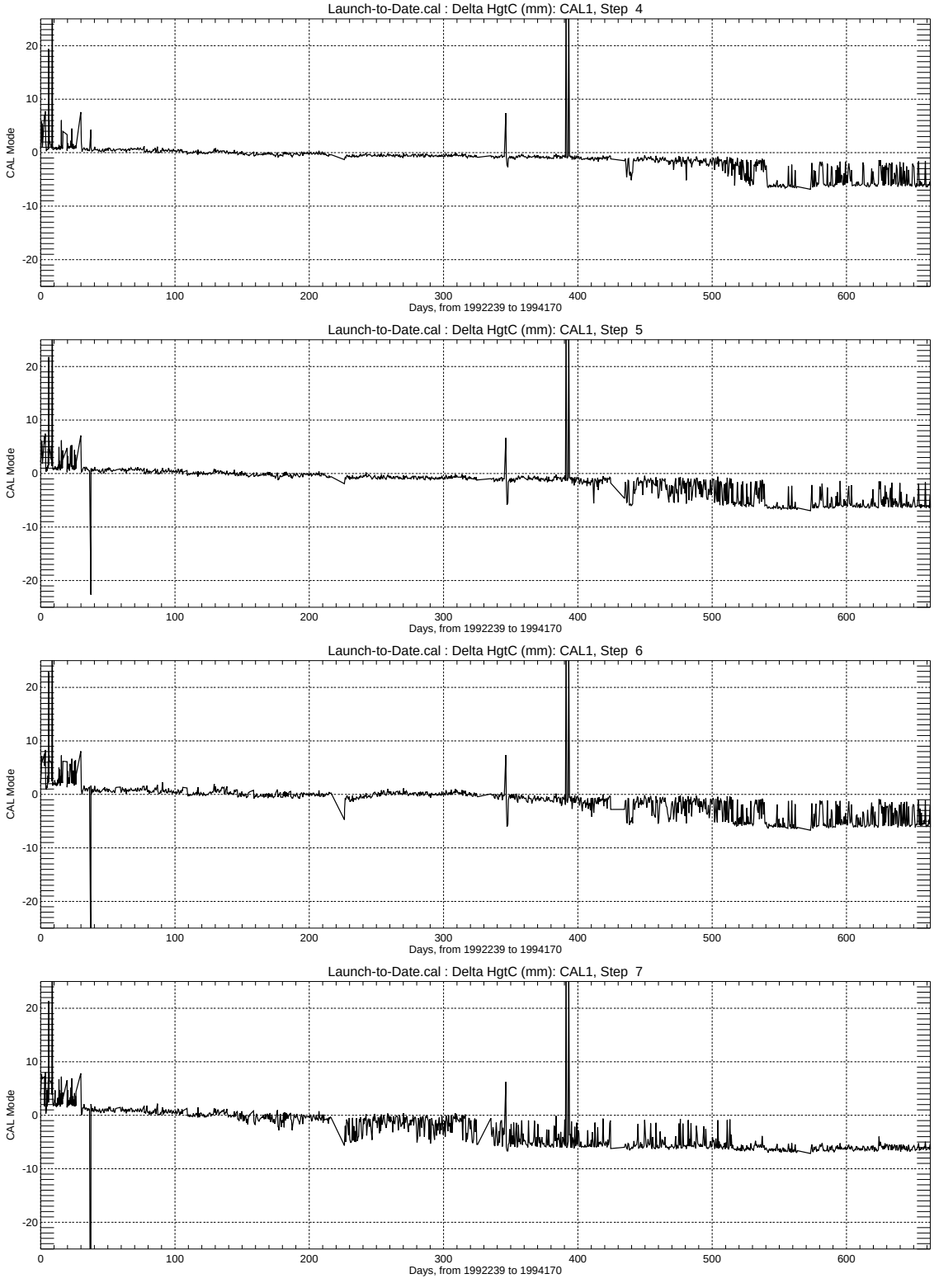

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

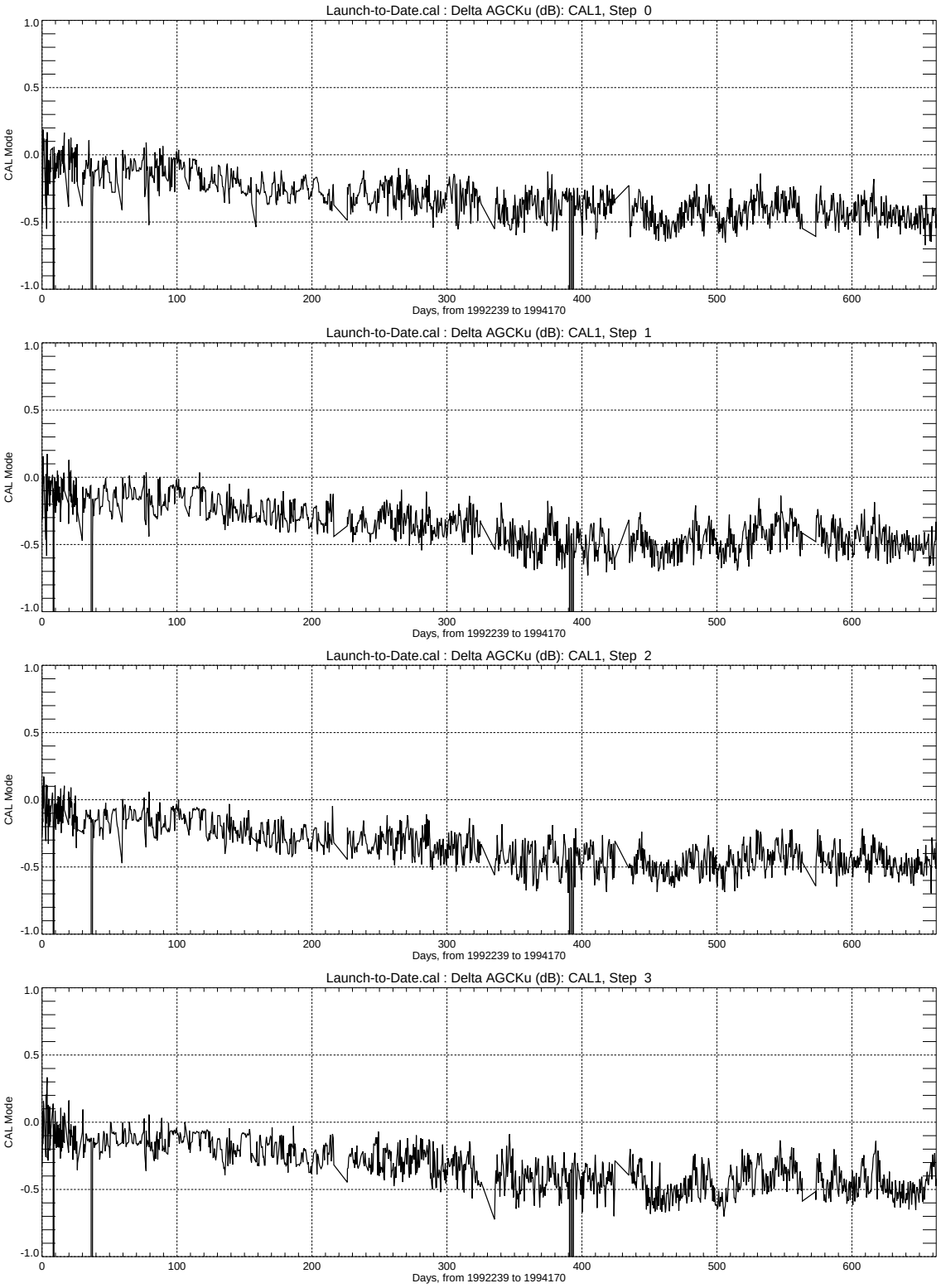

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

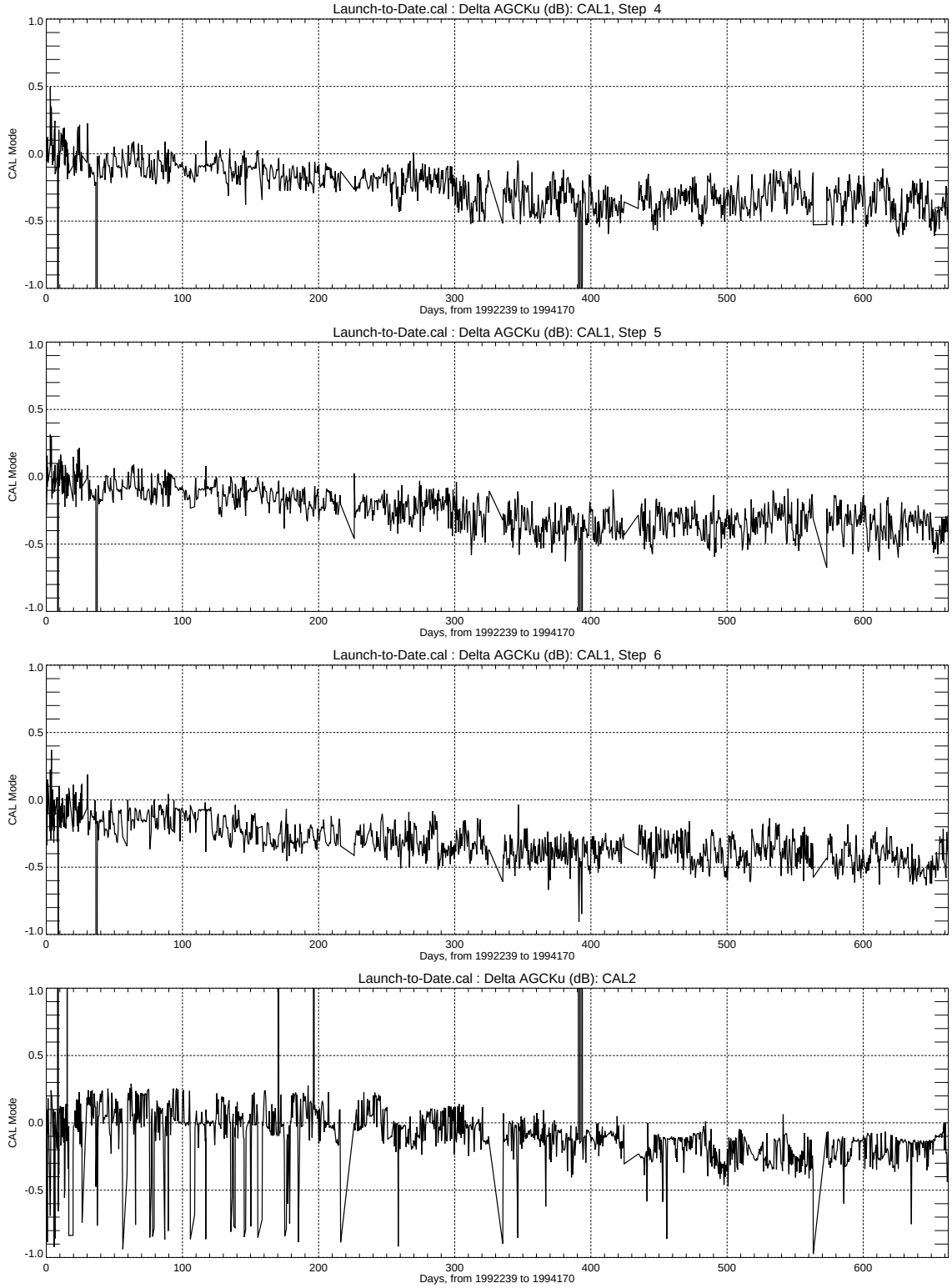

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

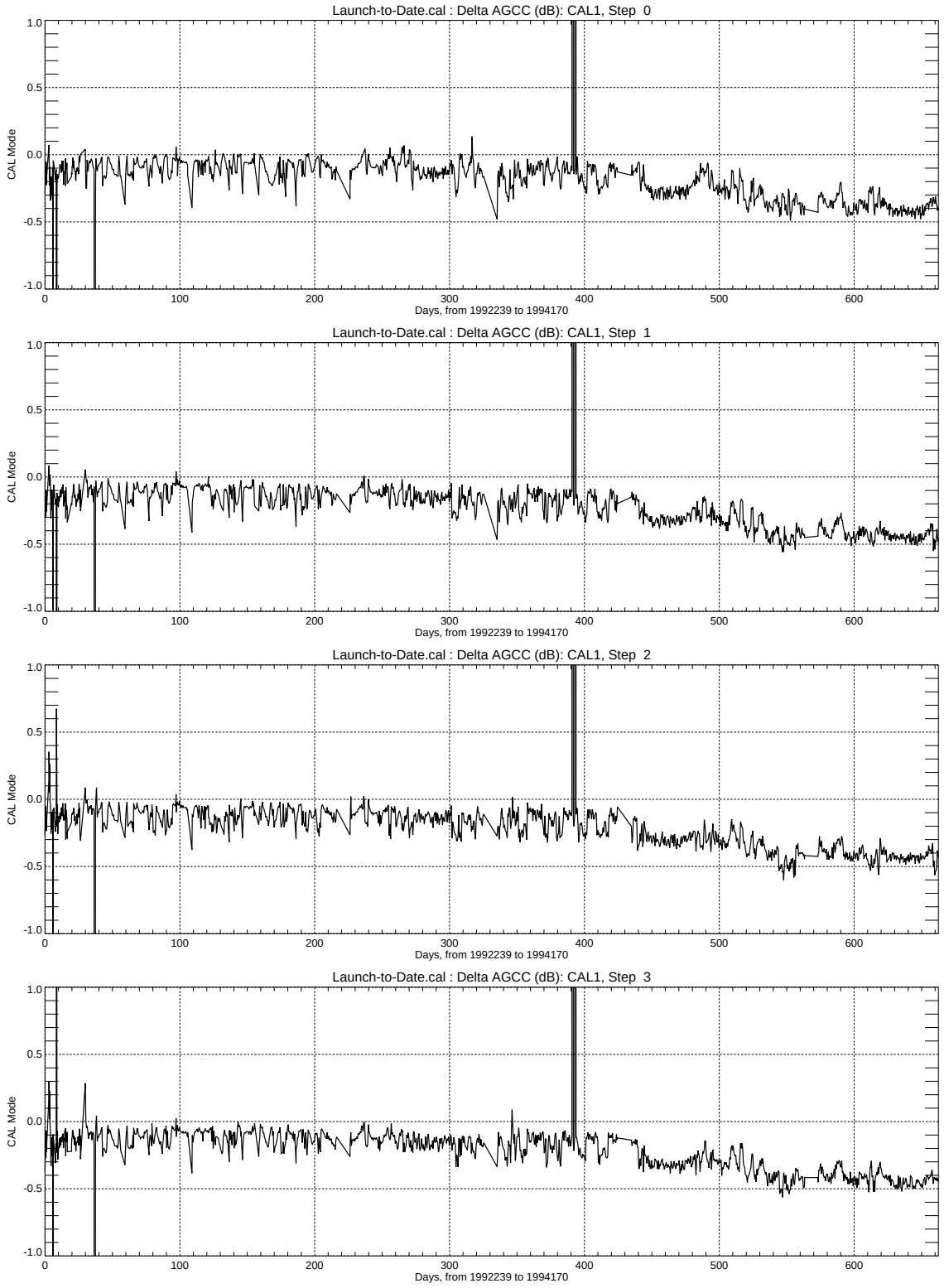

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

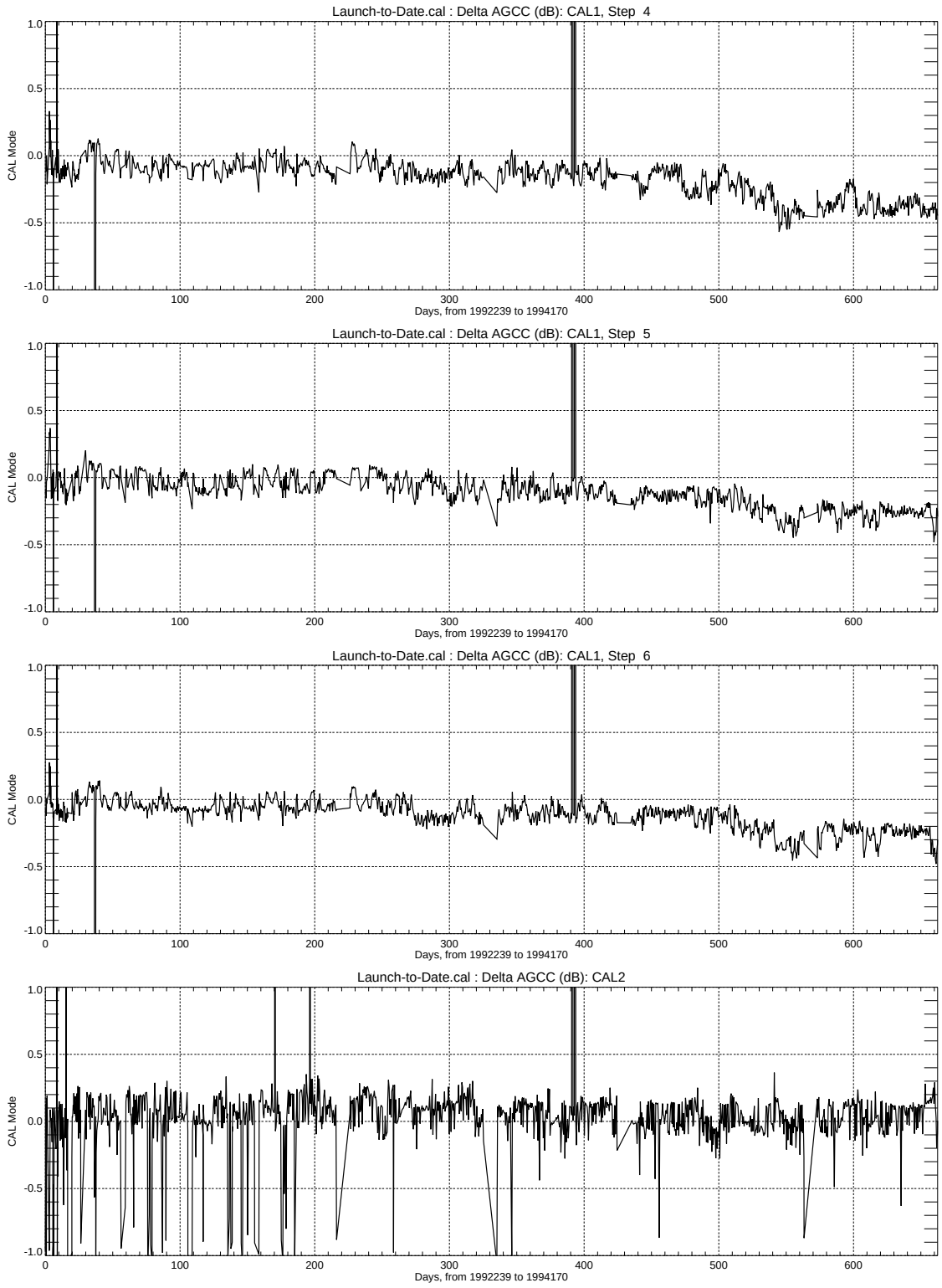

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

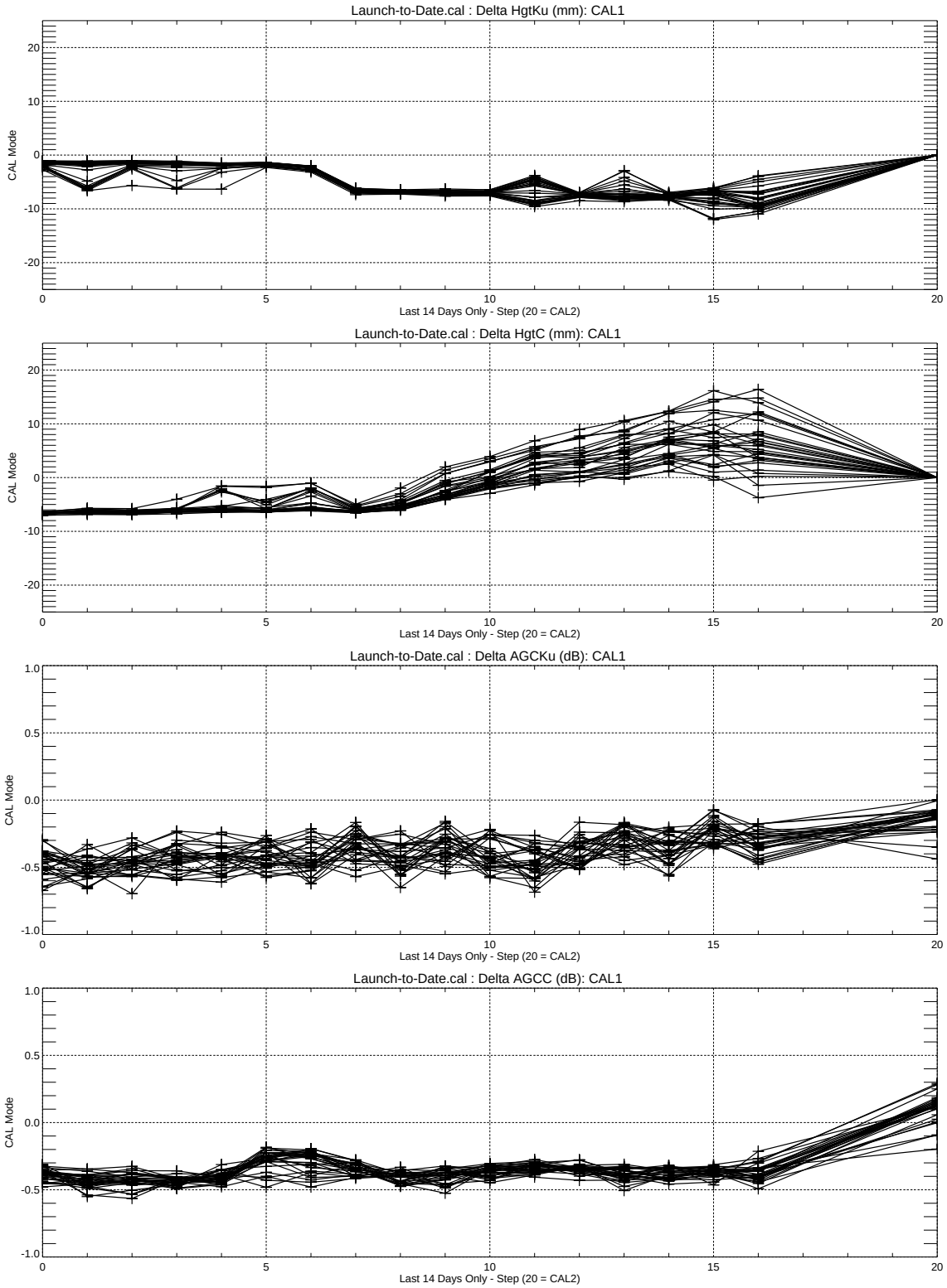

Figure A-8 Launch-to-Date CAL Plot Produced as Part of Weekly Processing (Continued)

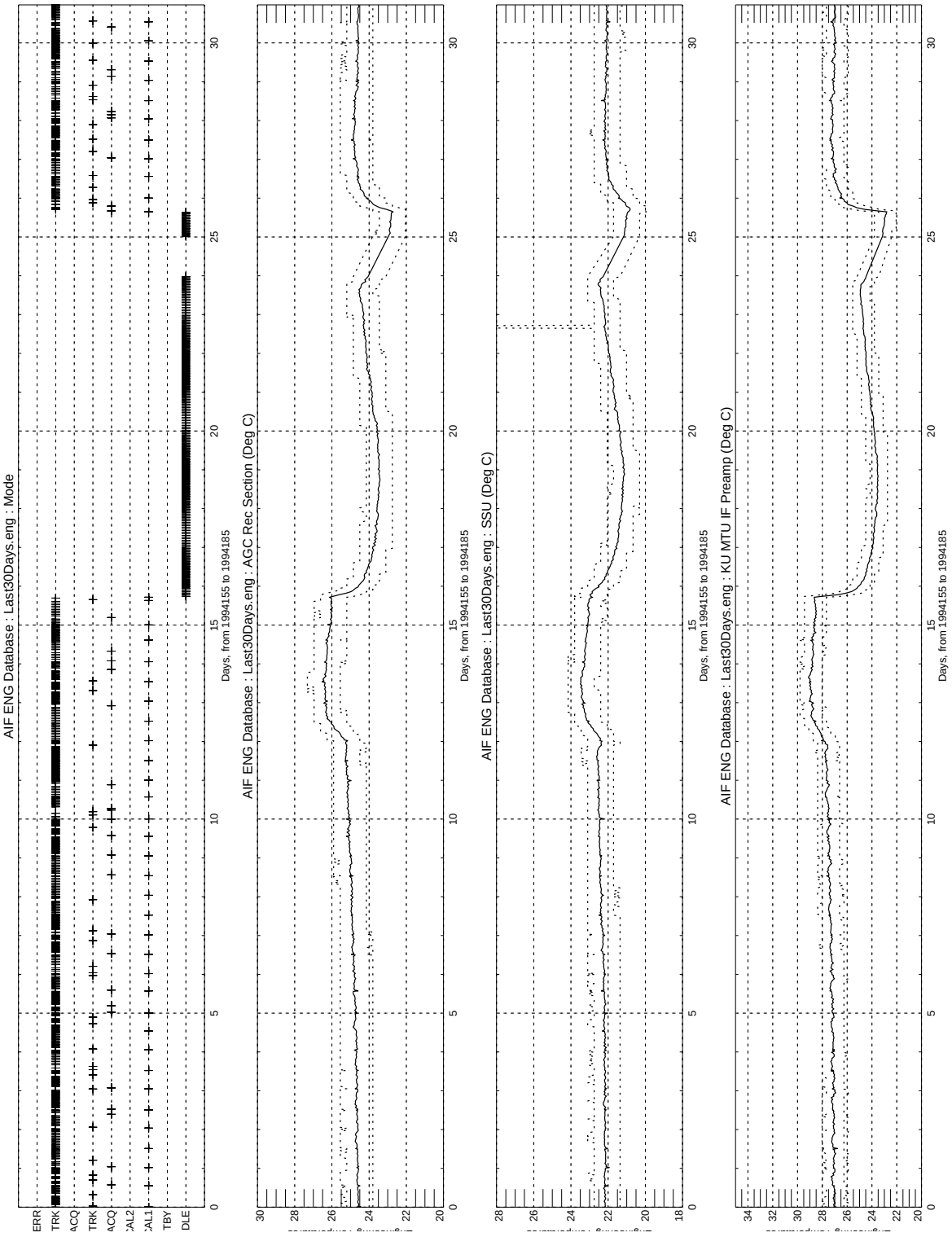

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing

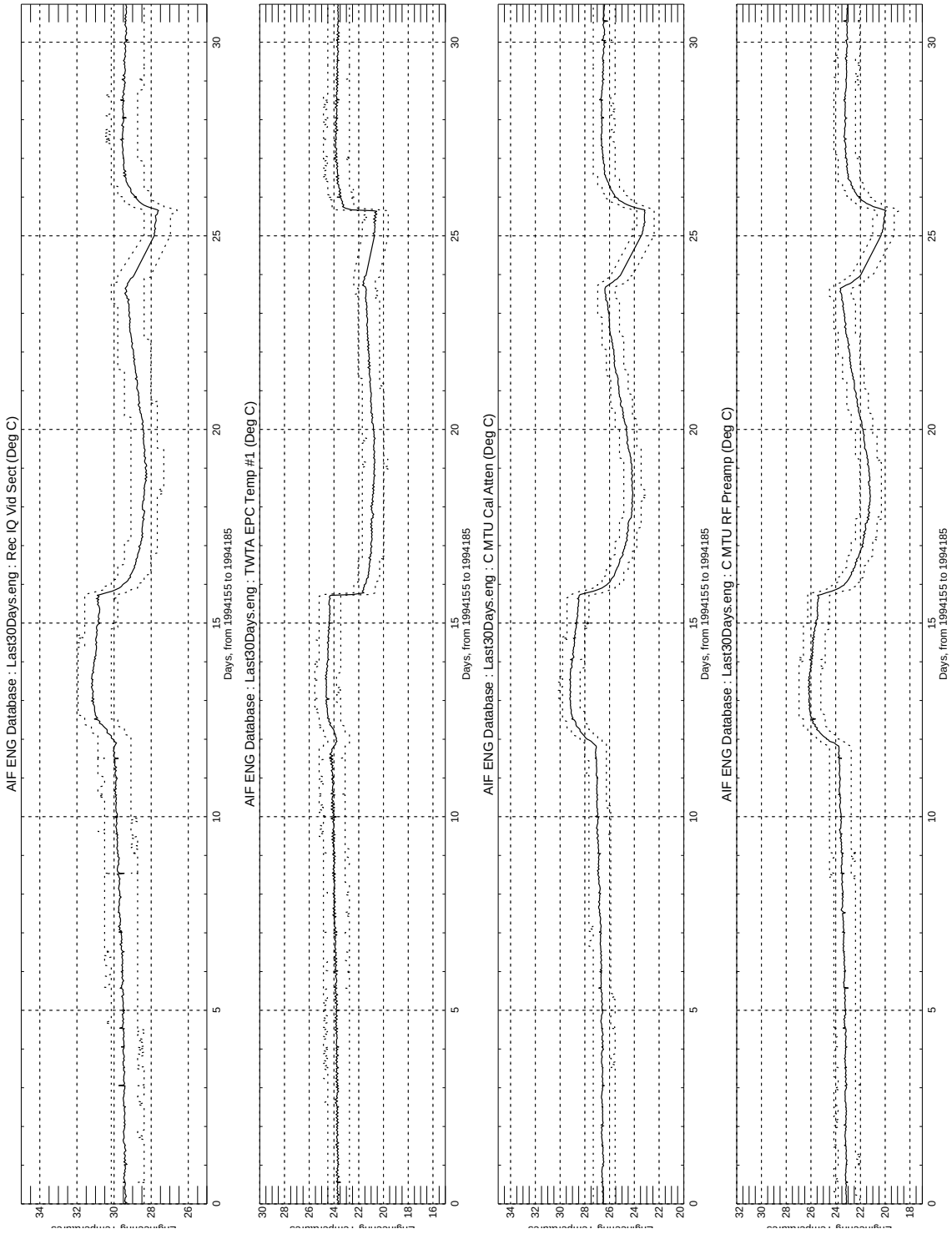

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

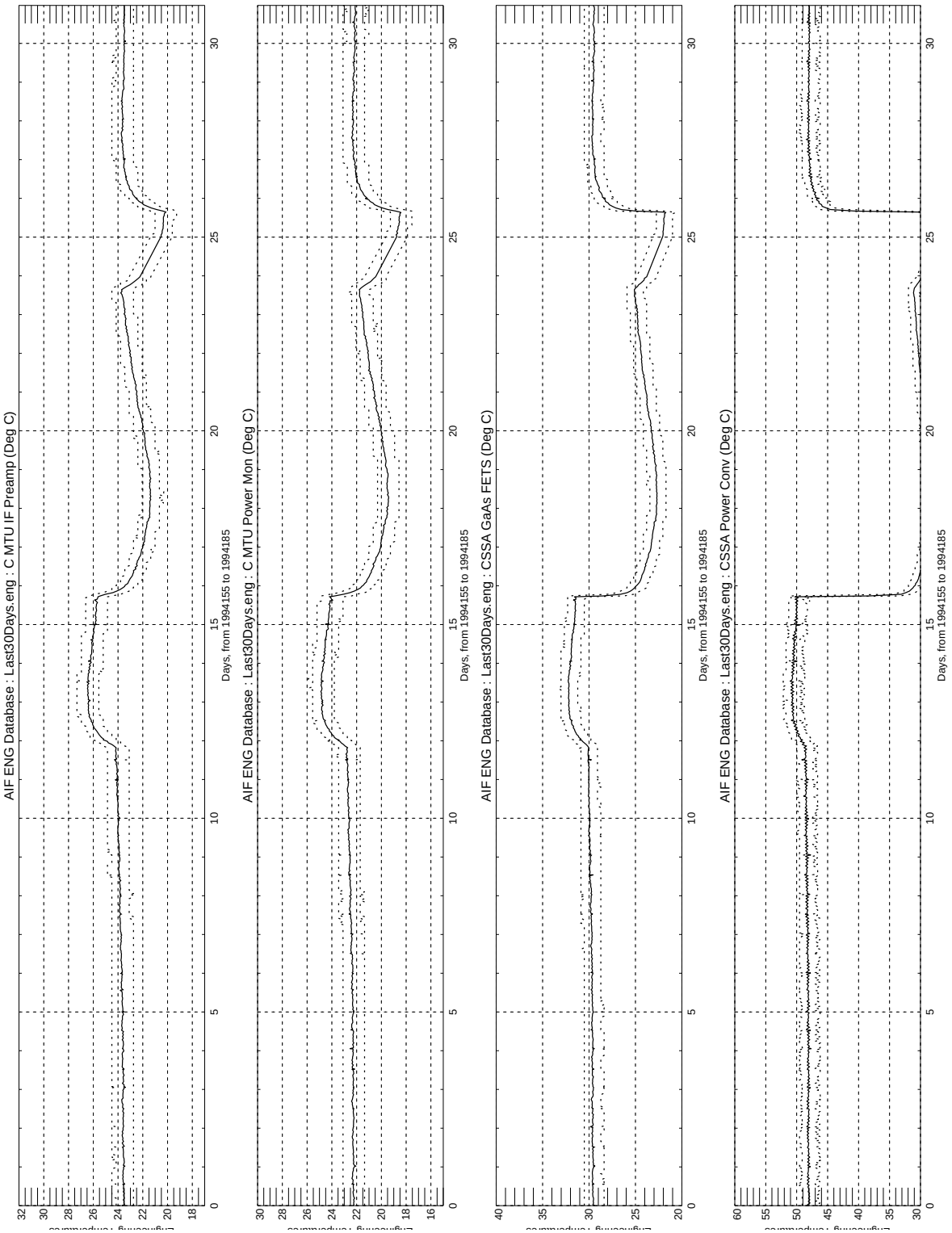

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

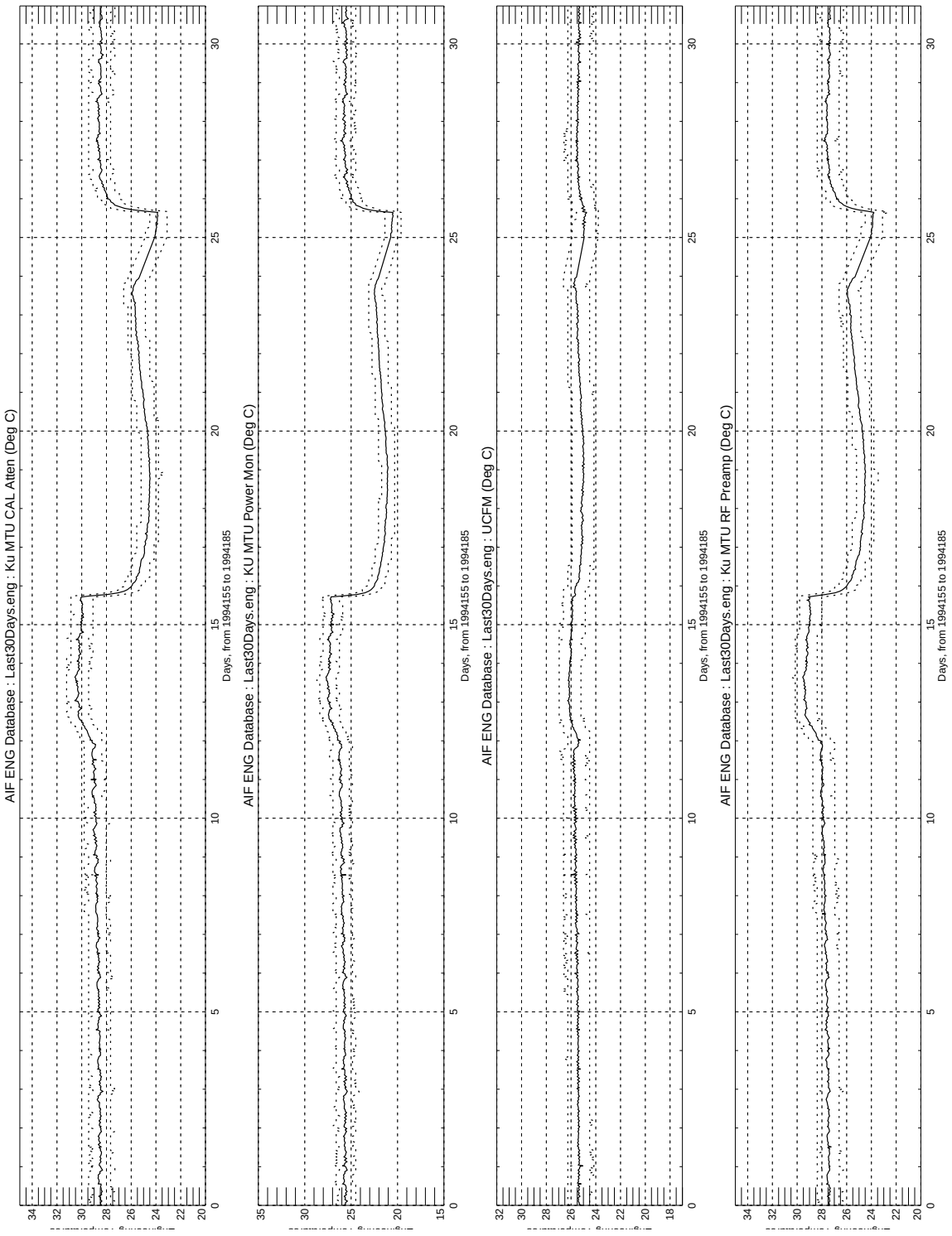

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

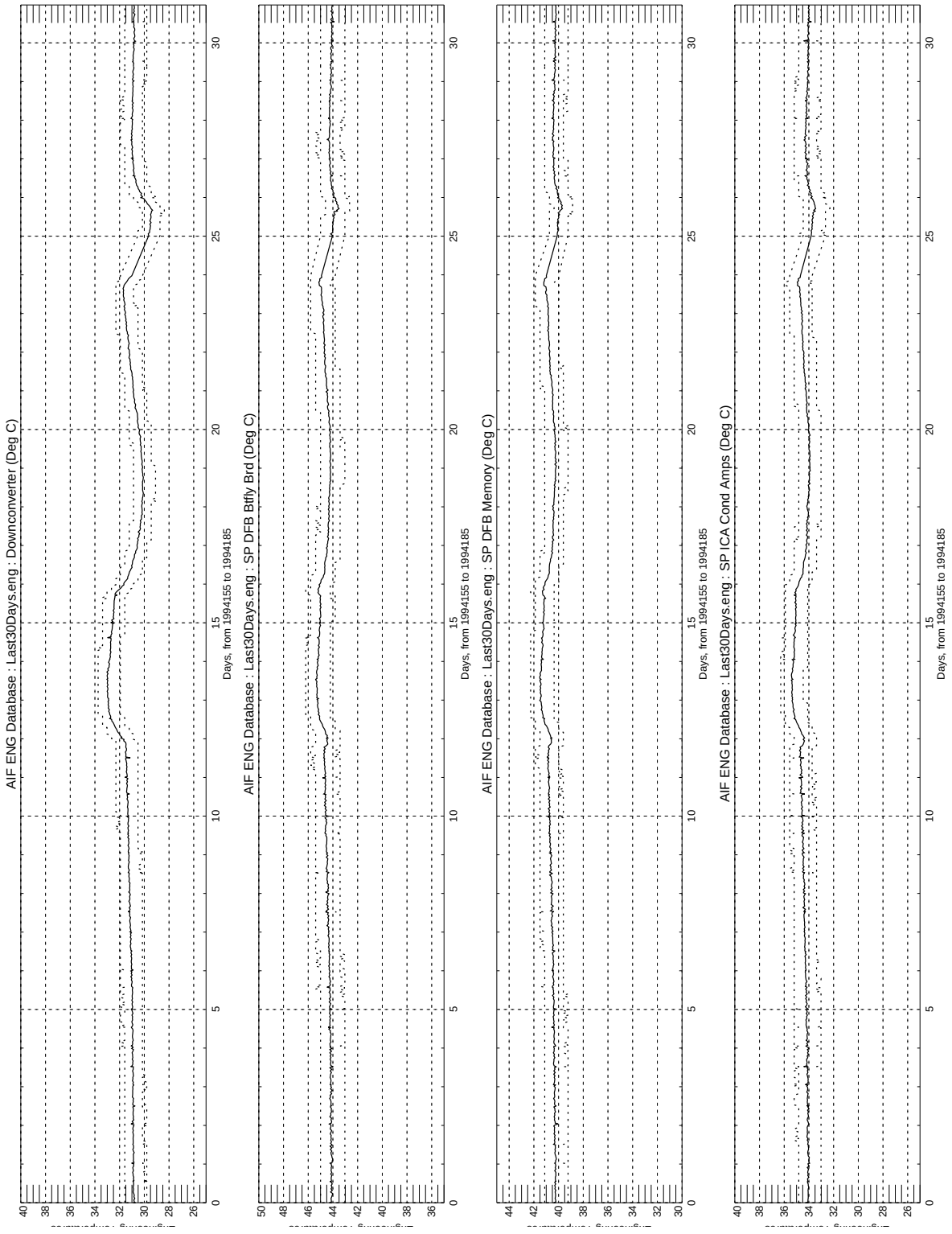

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

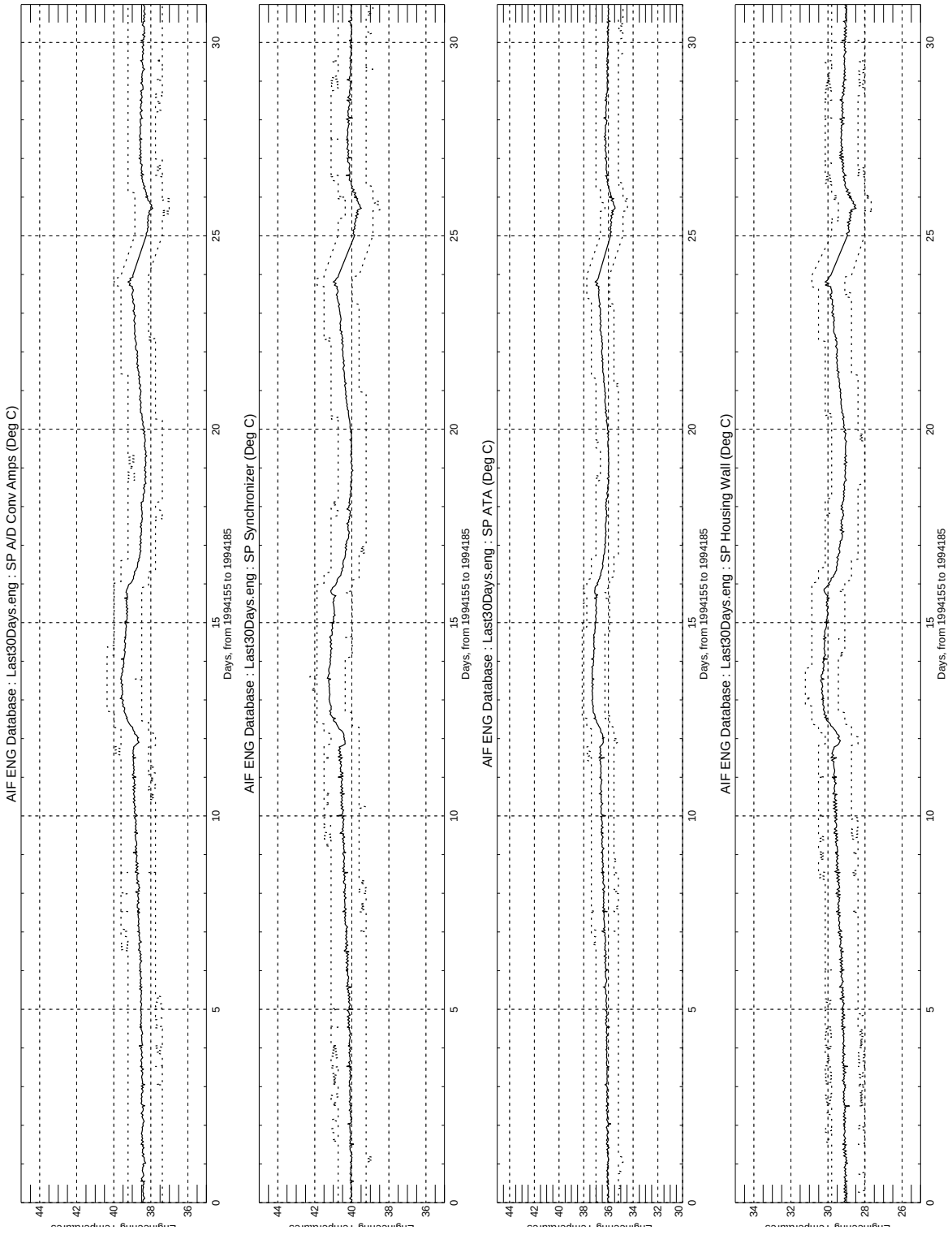

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

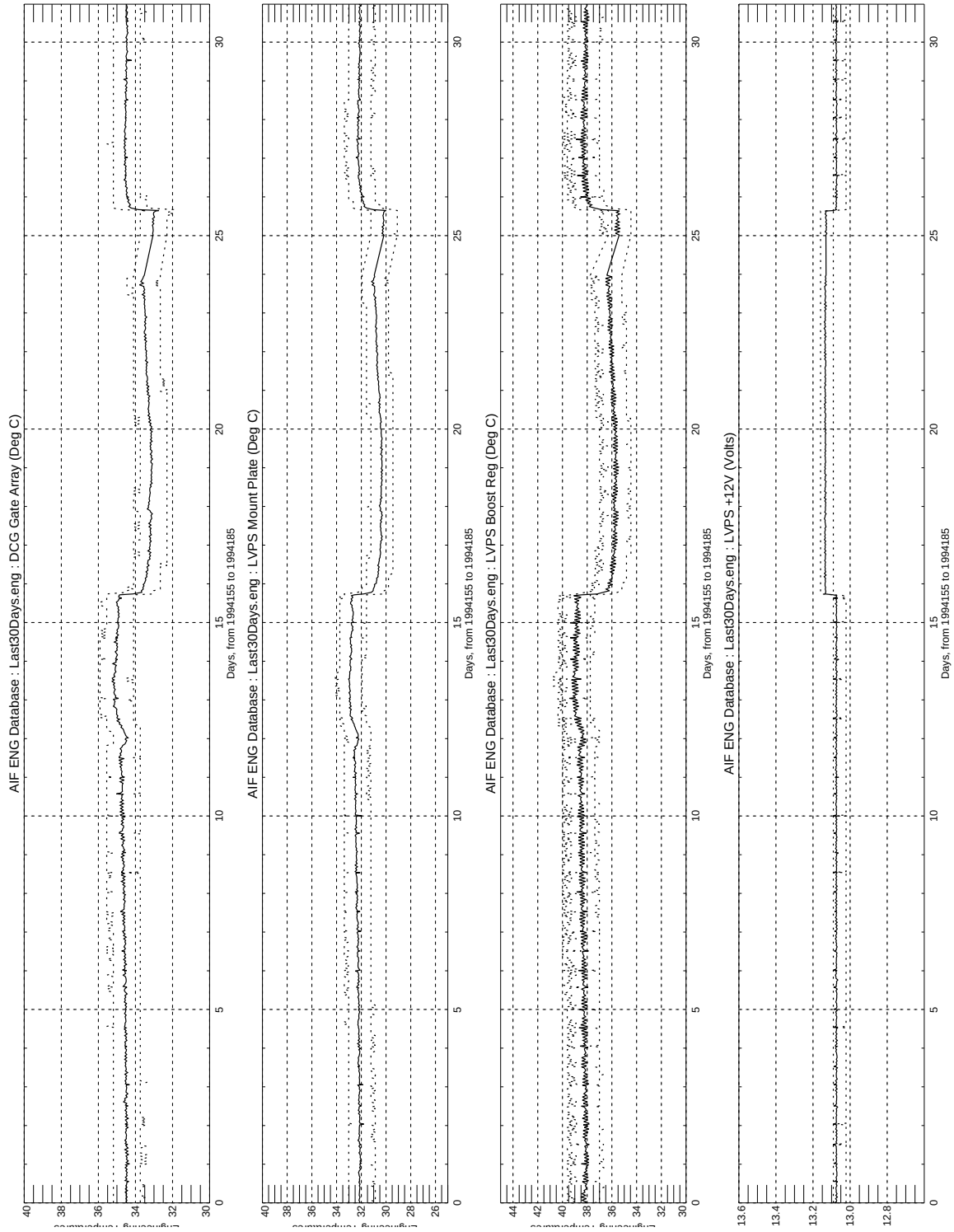

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

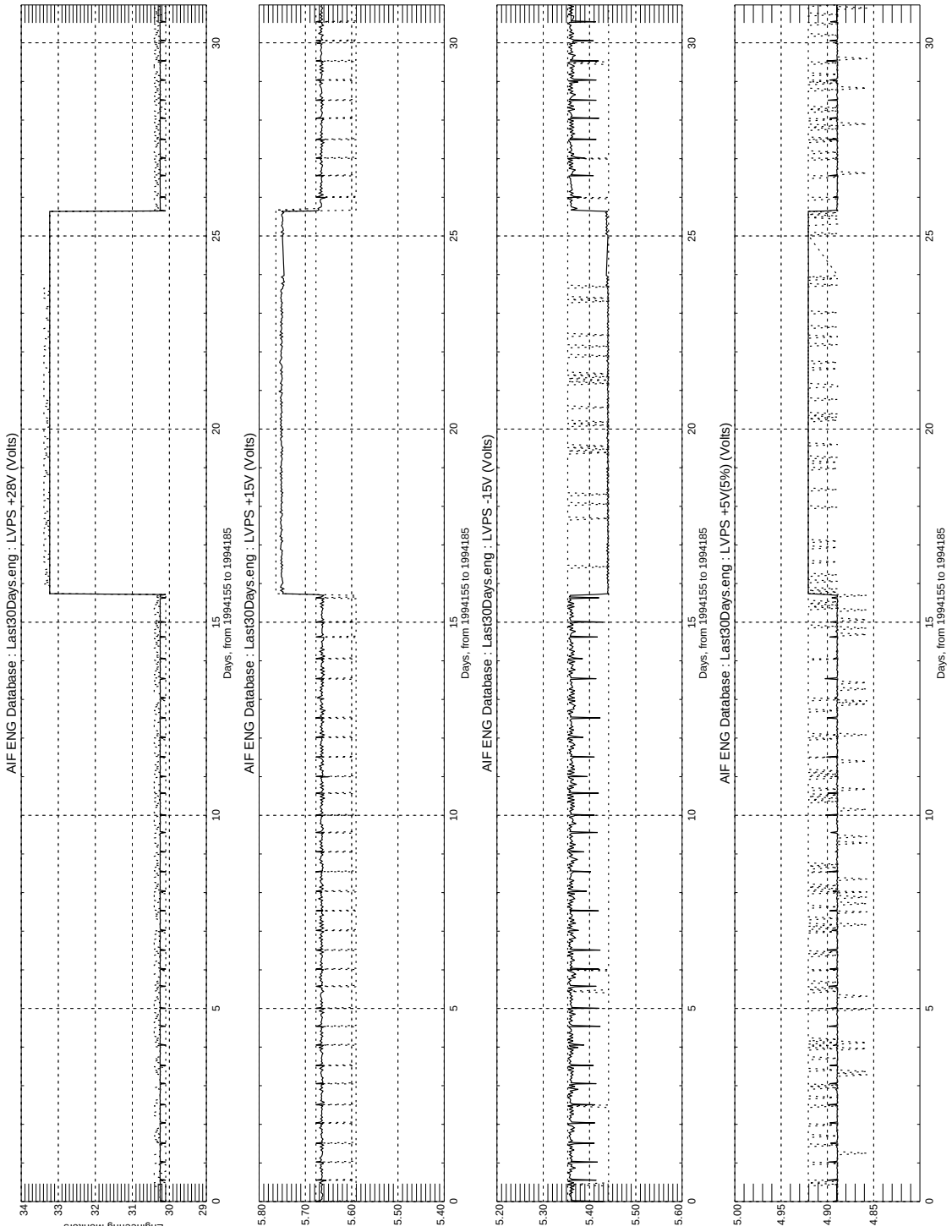

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

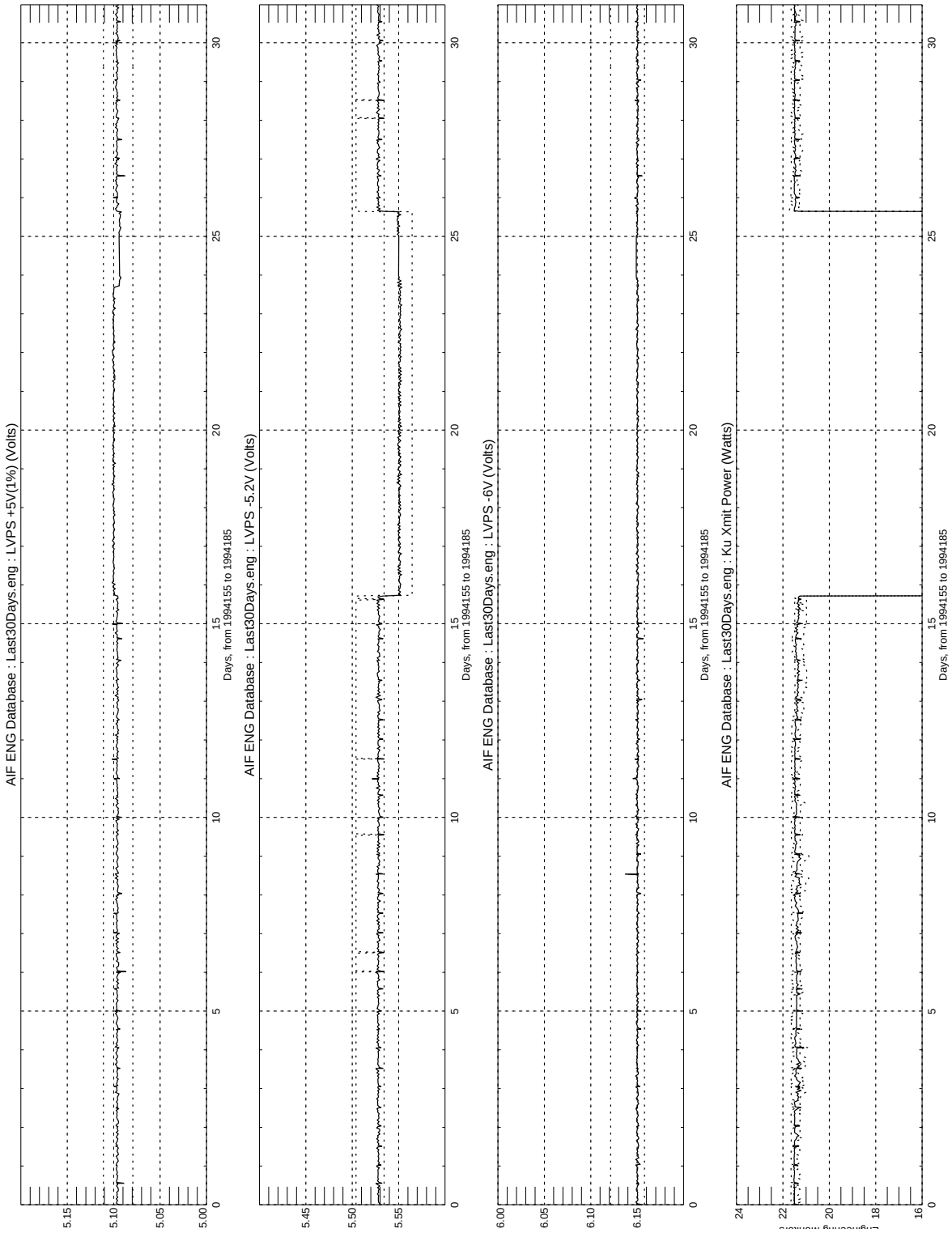

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

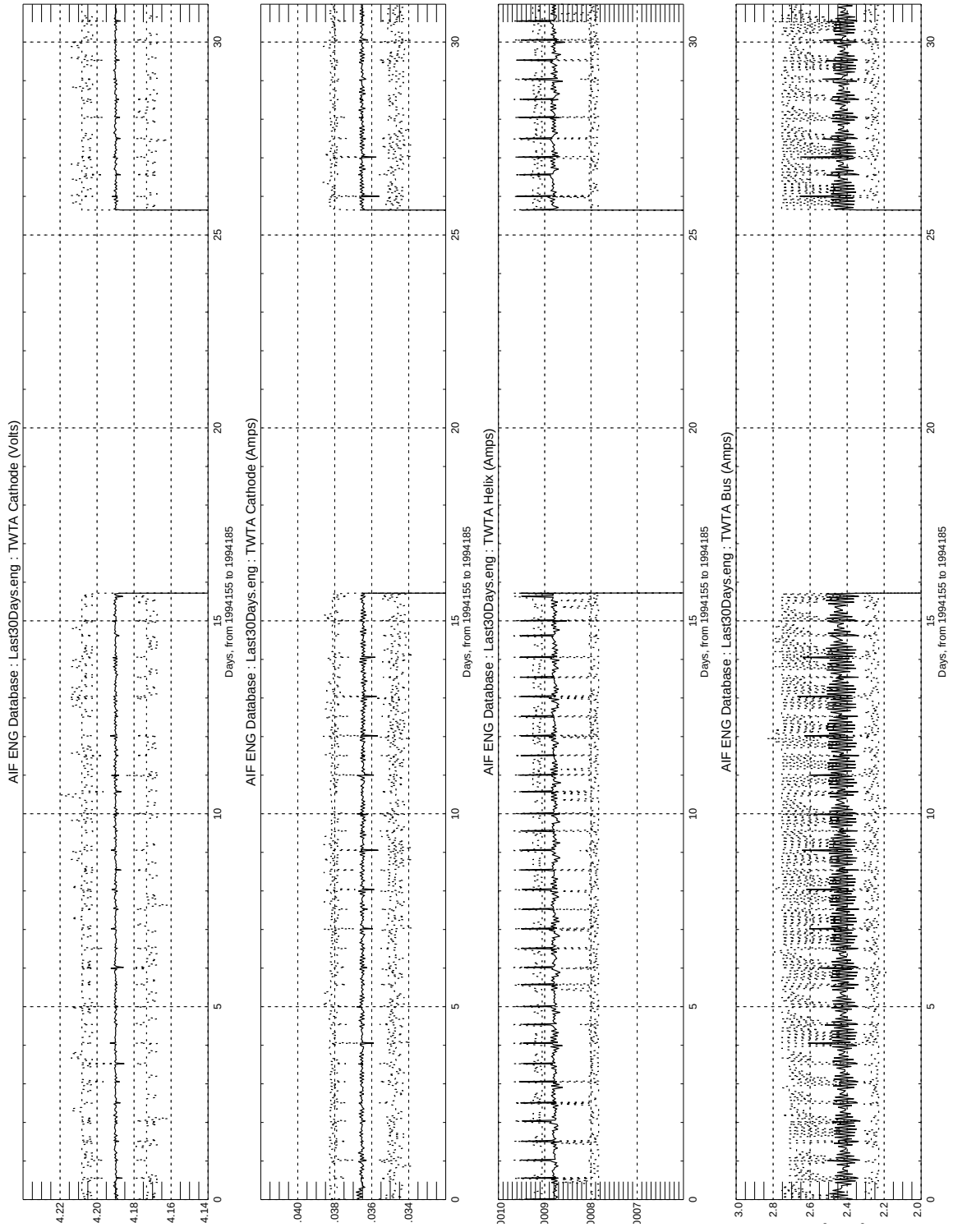

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

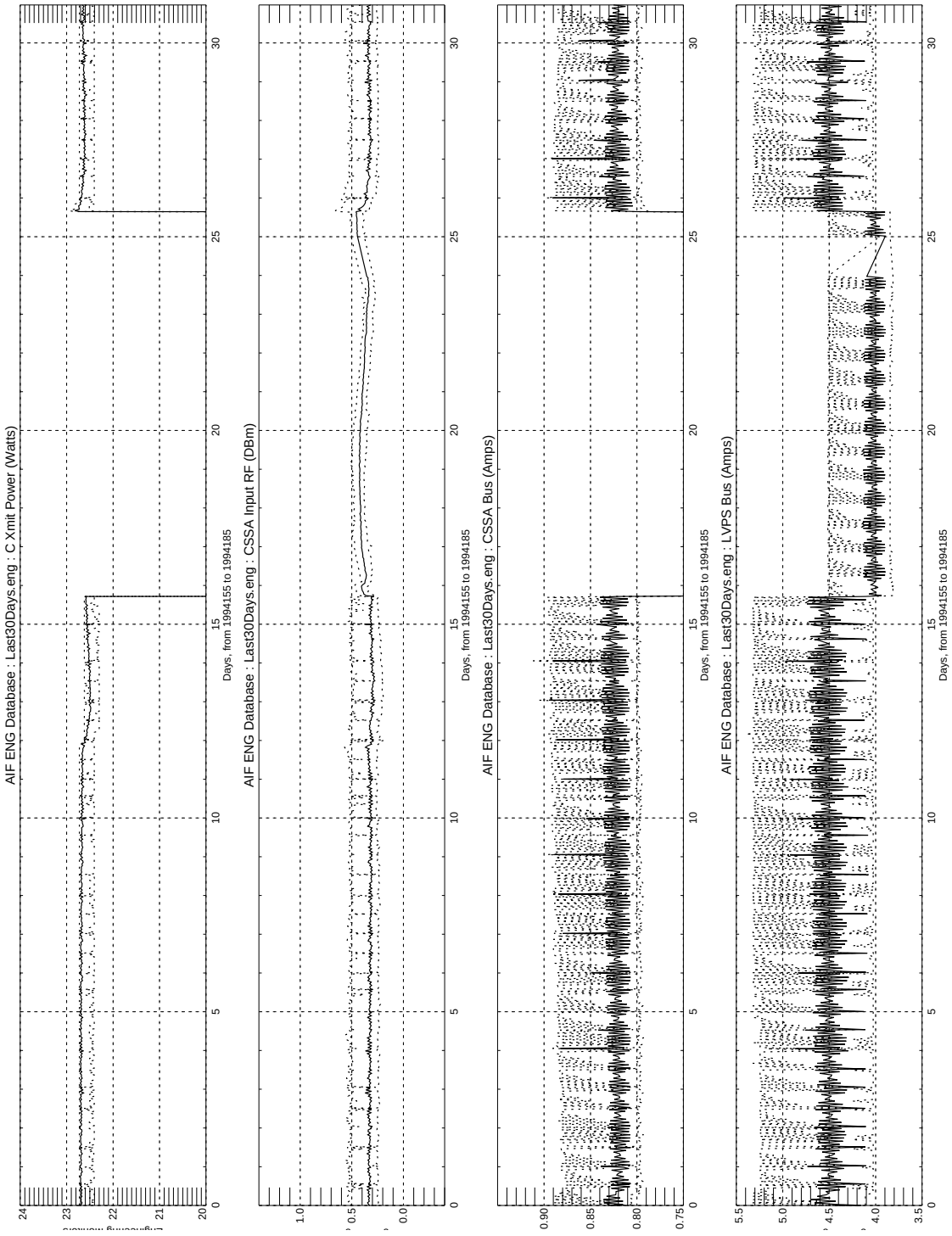

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

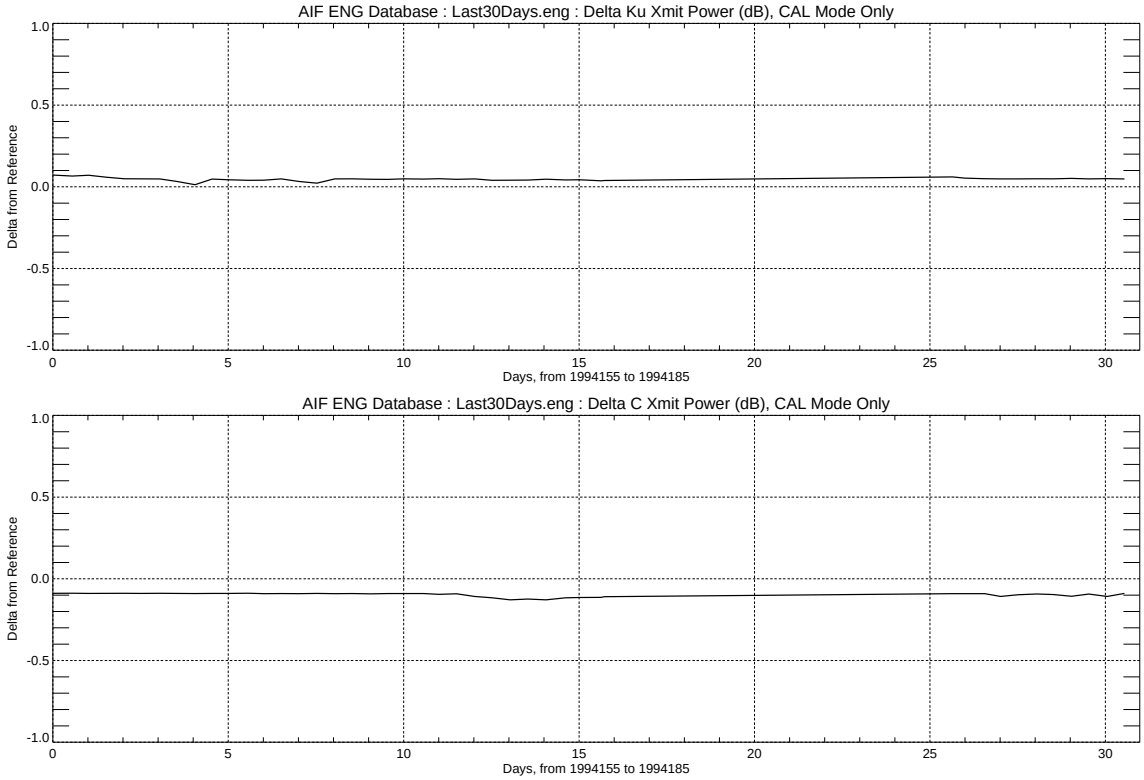

Figure A-9 Launch-toDate ENG Plot Produced as Part of Weekly Processing (Continued)

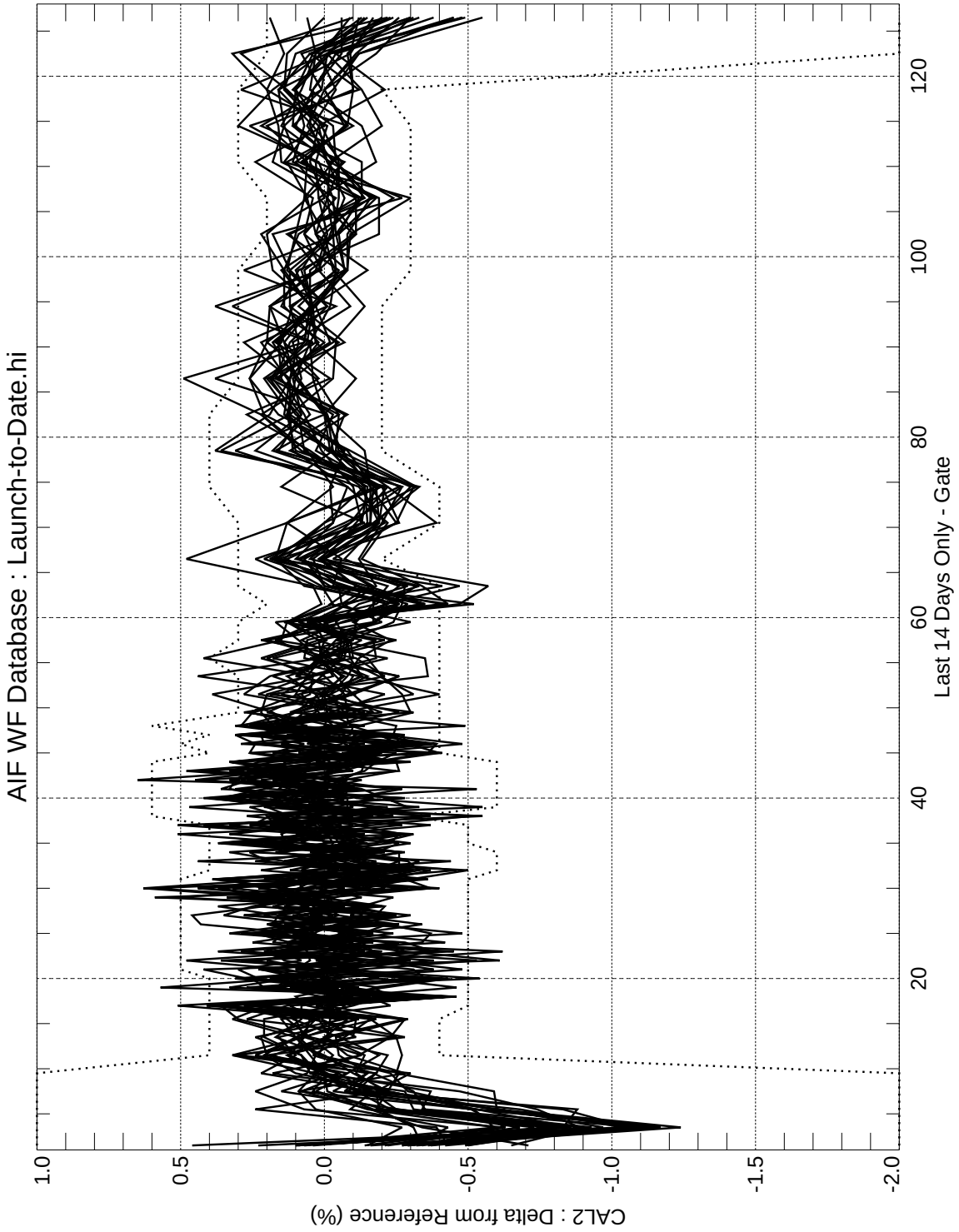

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

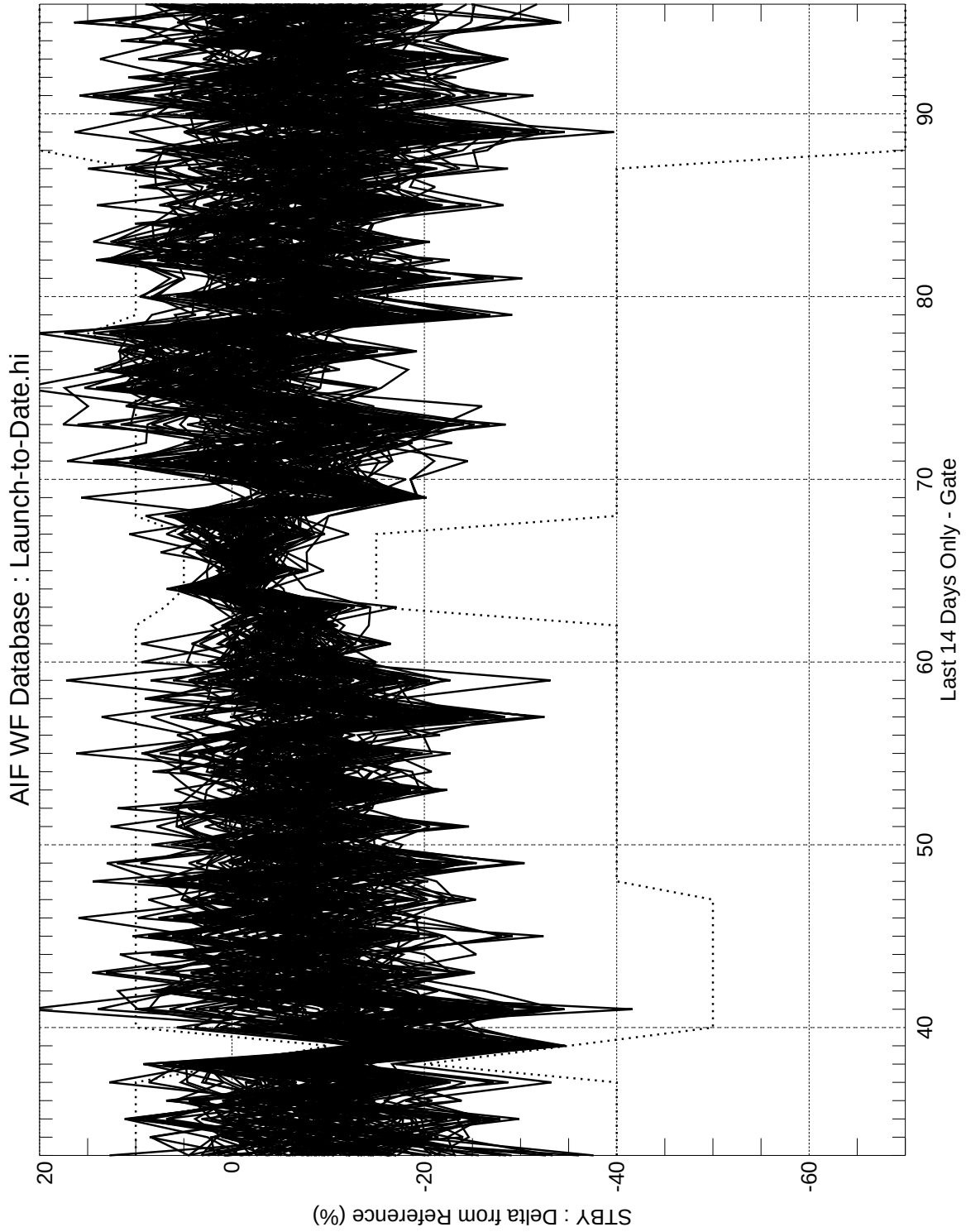

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

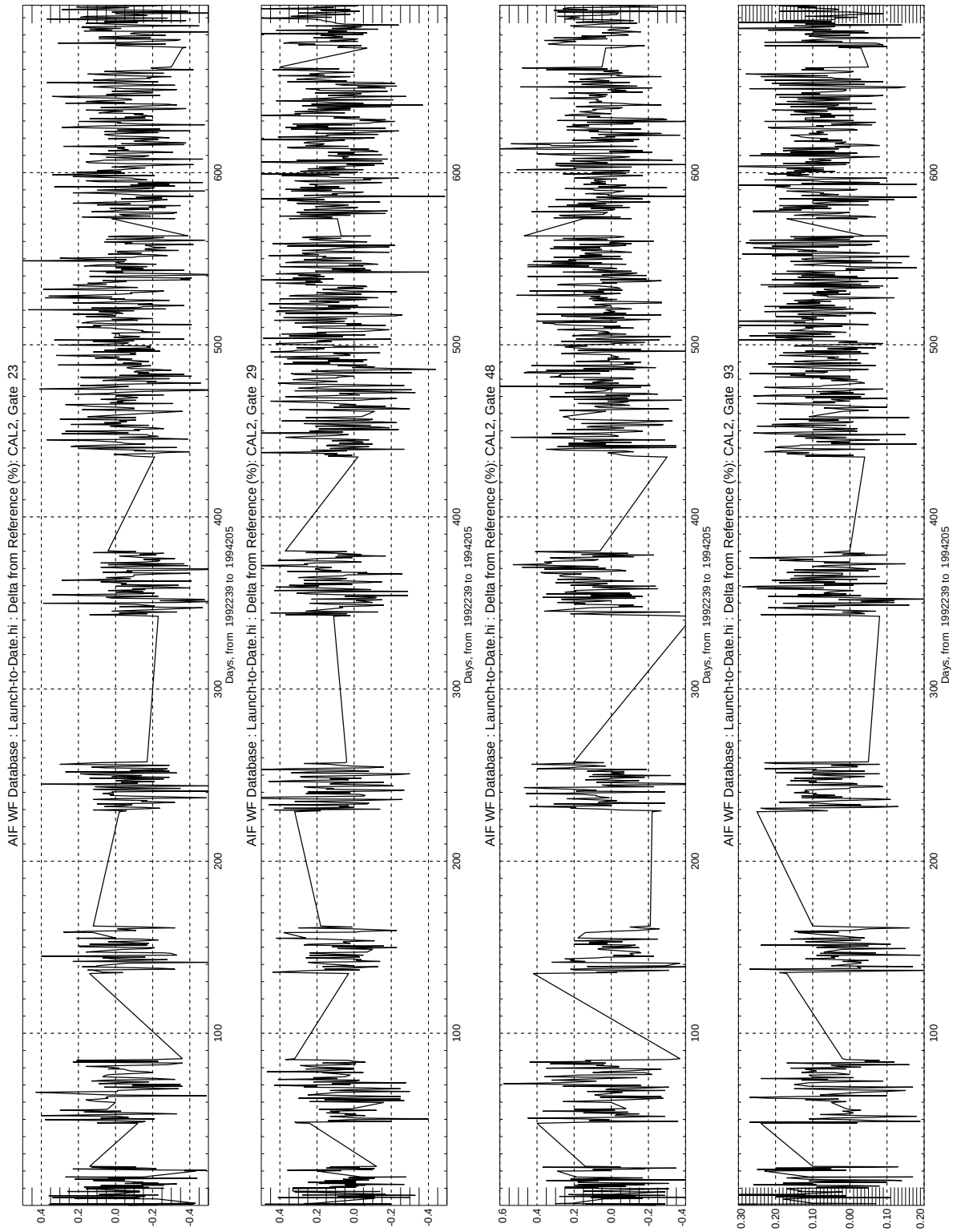

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

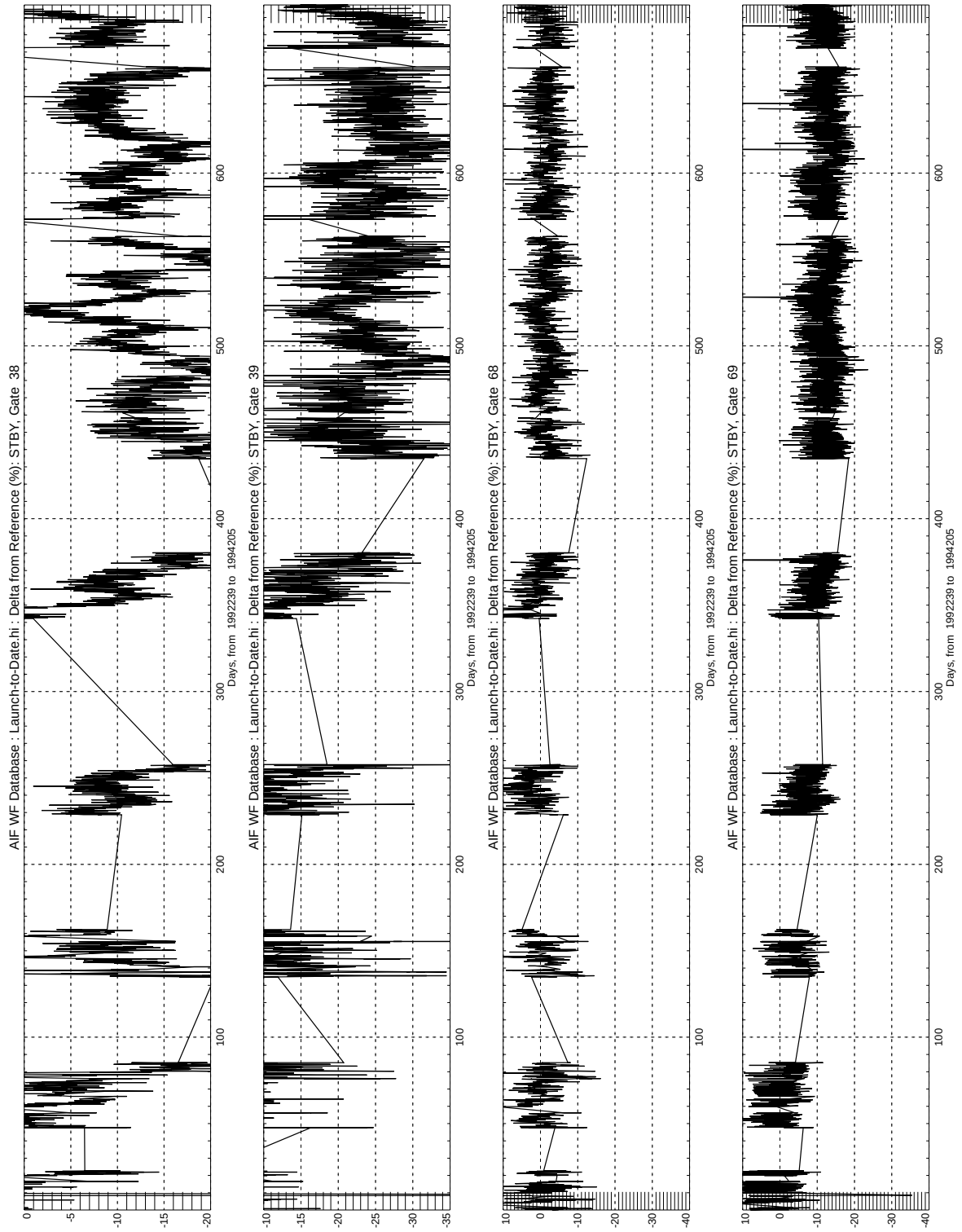

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

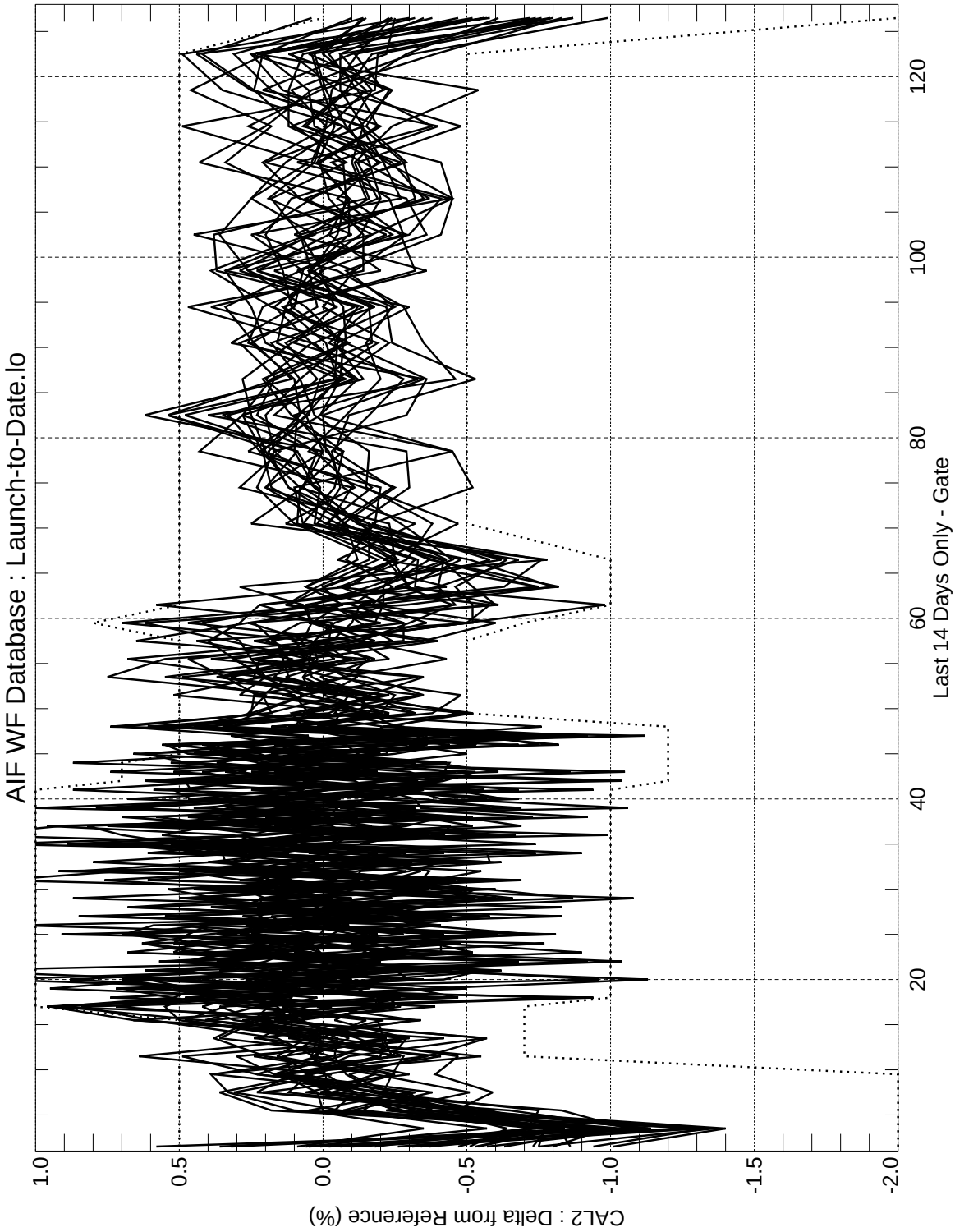

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

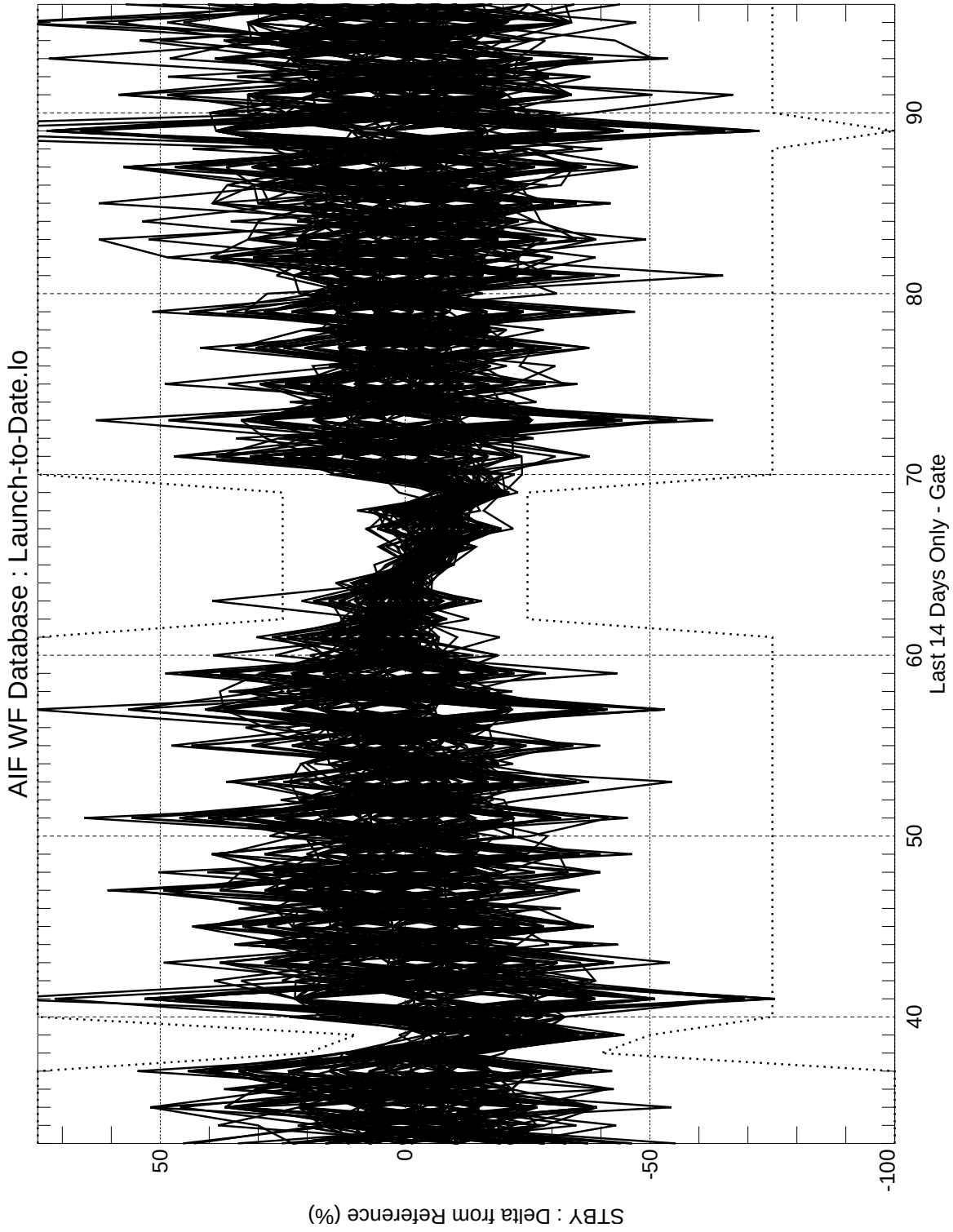

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

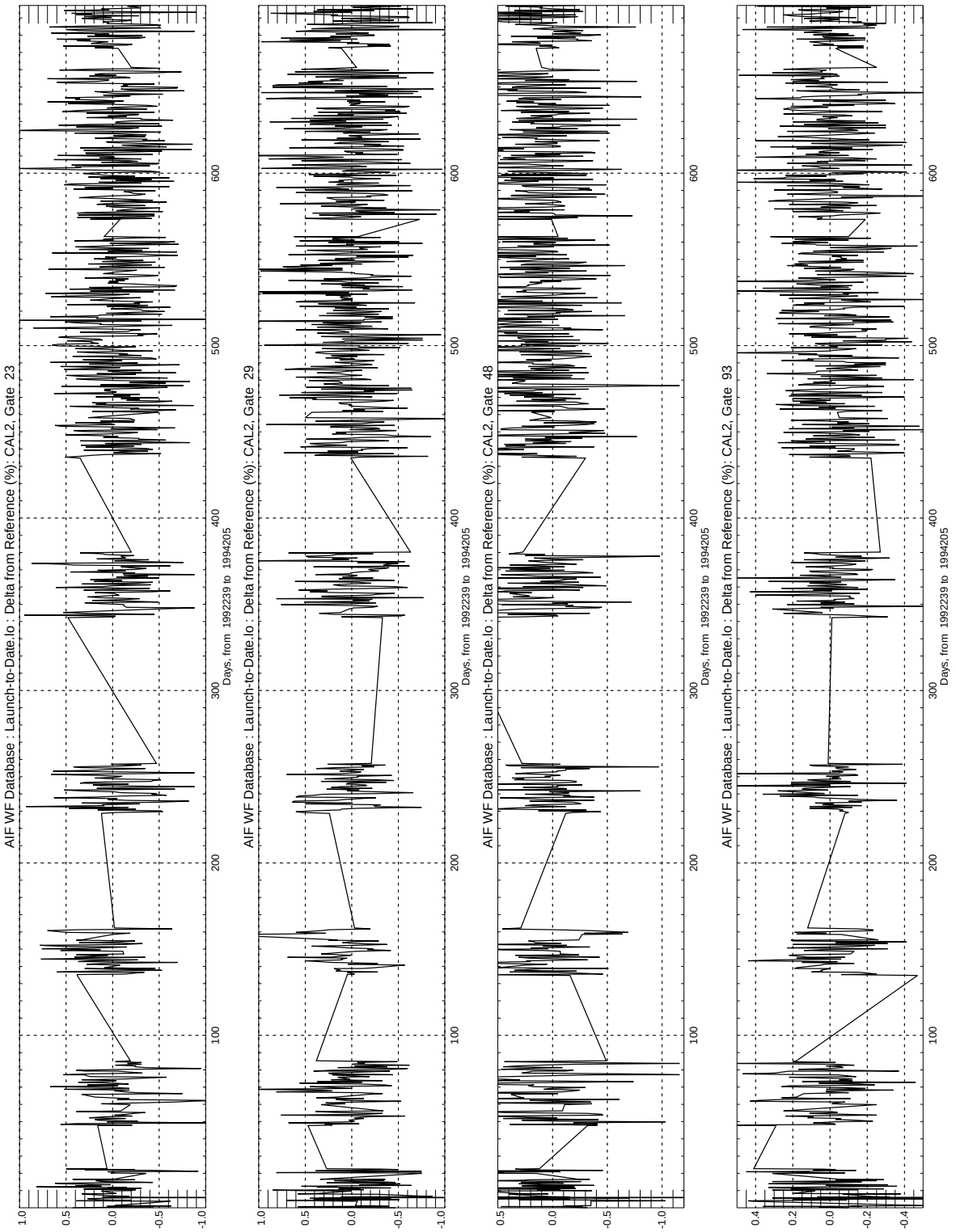

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

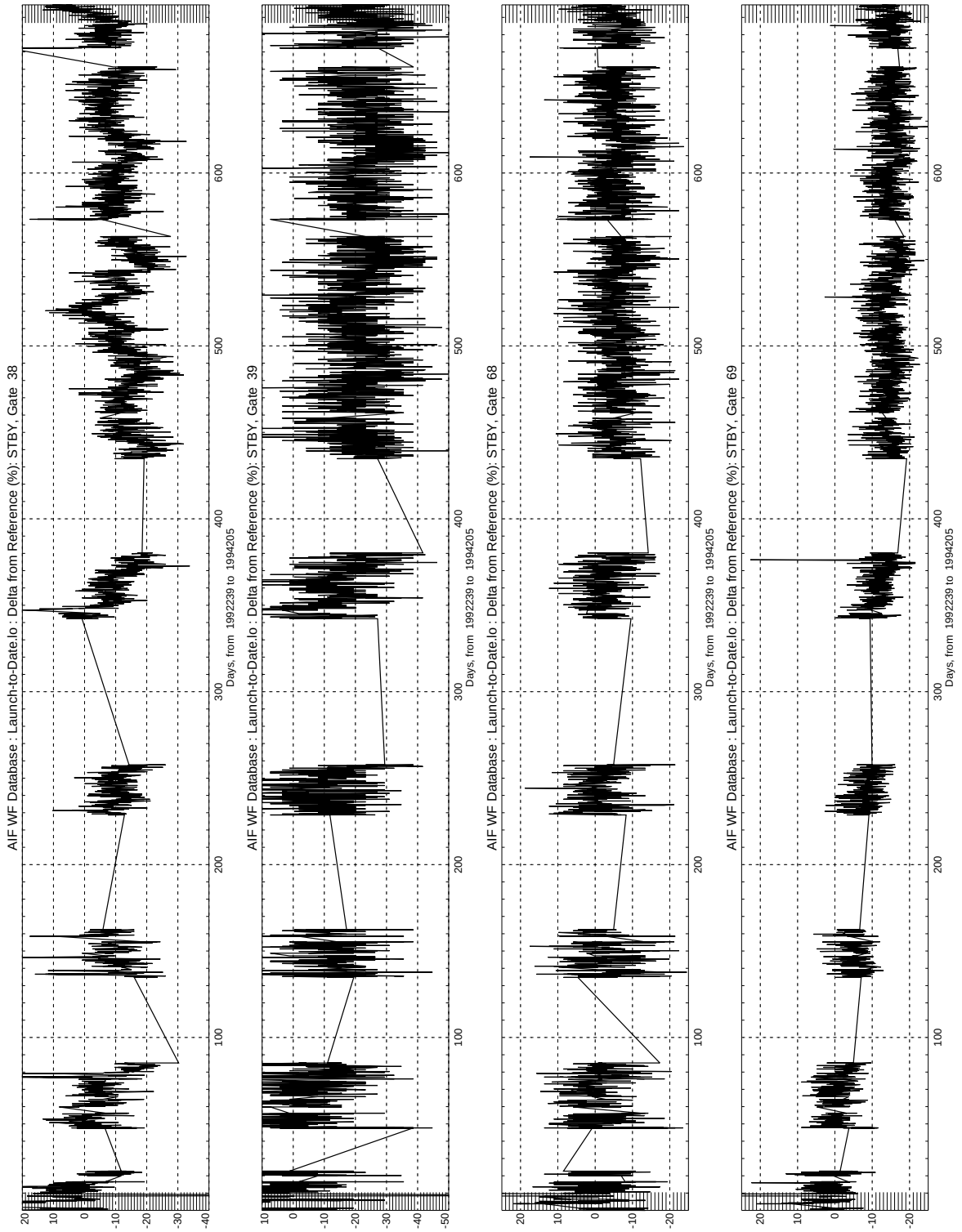

Figure A-10 Launch-to-Date WF Difference Plot Produced as Part of Weekly Processing

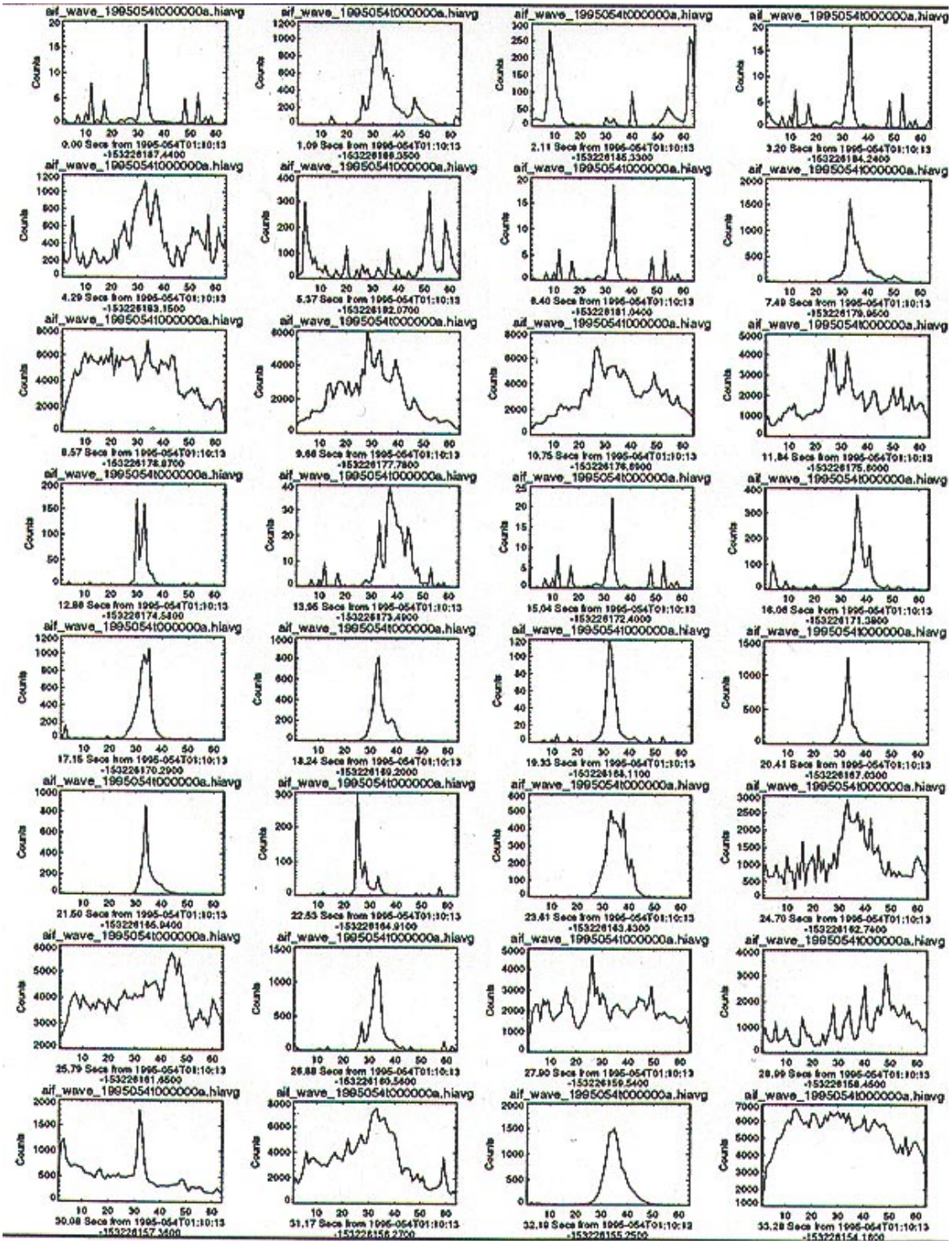

Figure A-11 Waveform Average Plot Produced as Part of Special Processing

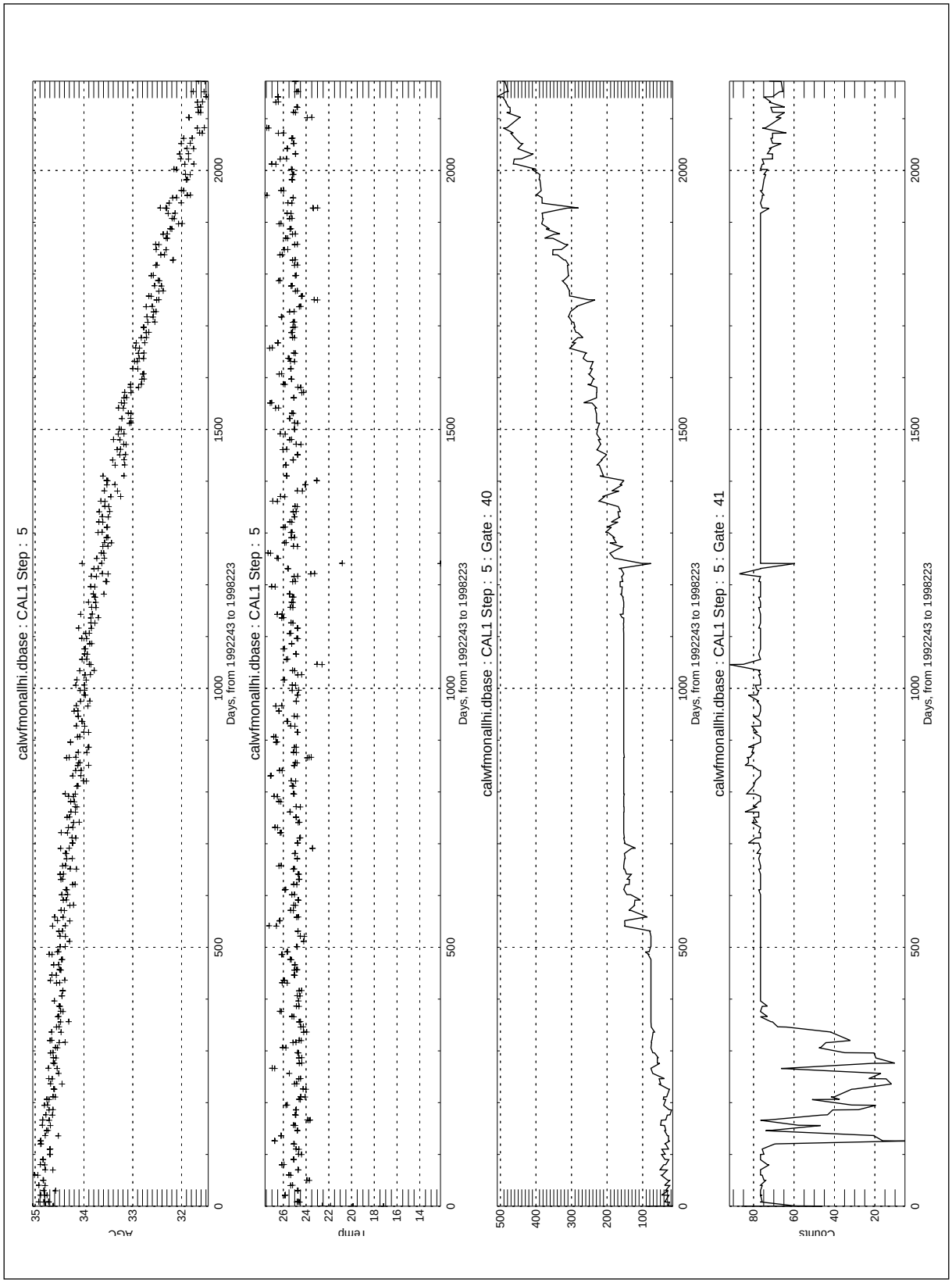

Figure A-12 Cal1 Step Waveform Trend Plot (Pg. 1 of 5)

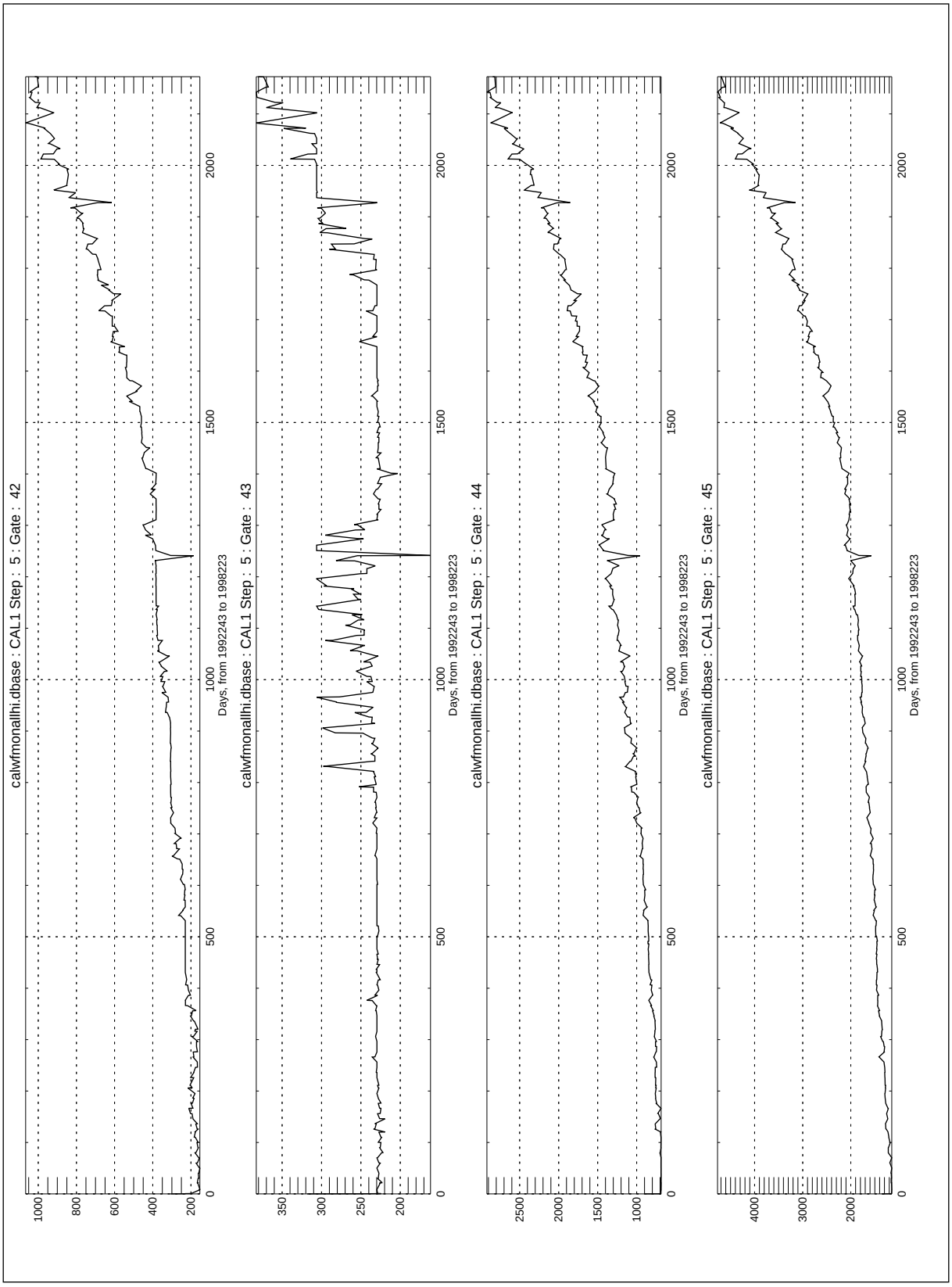

Figure A-13 Cal1 Step Waveform Trend Plot (Pg. 2 of 5)

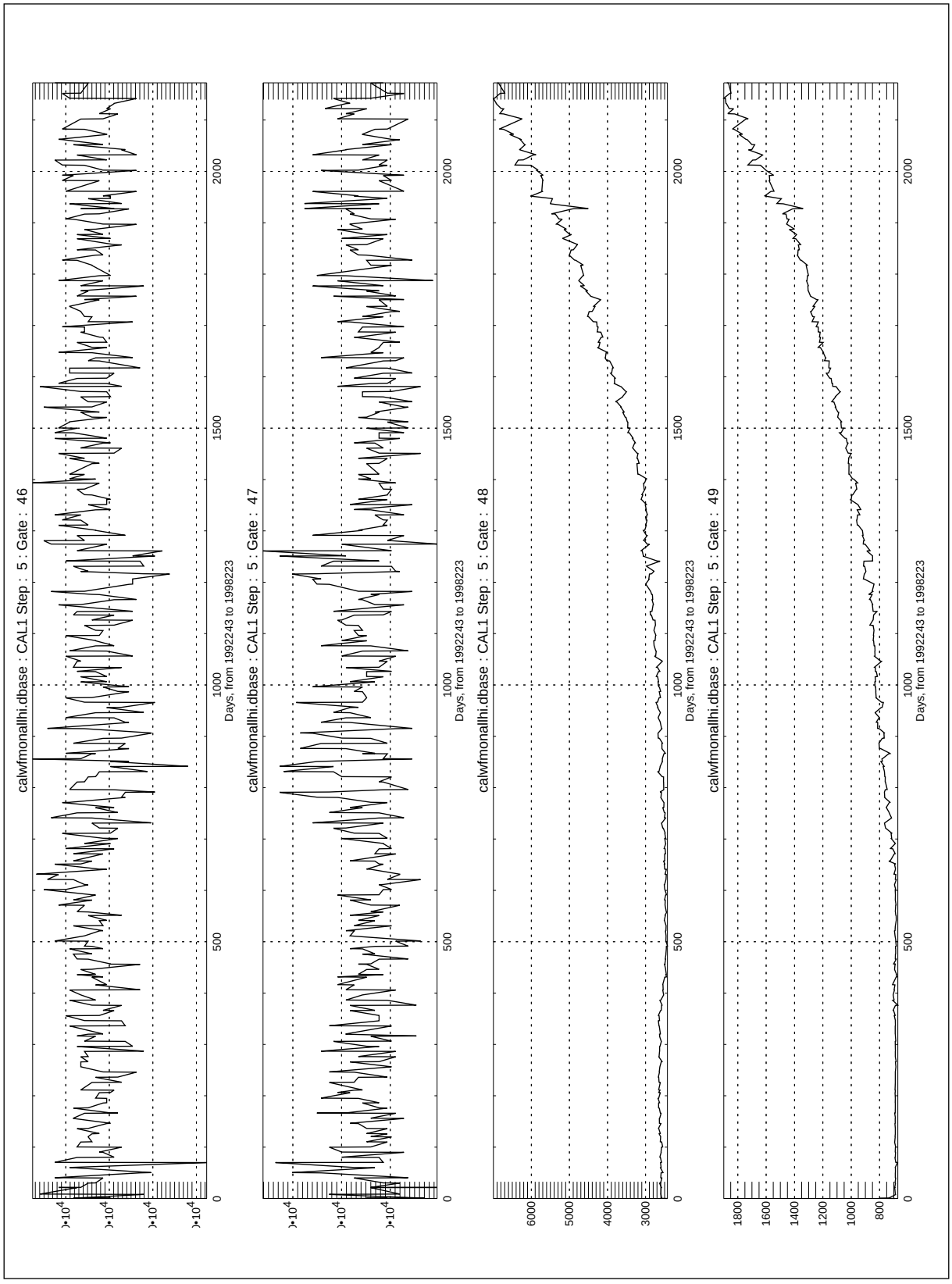

Figure A-14 Cal1 Step Waveform Trend Plot (Pg. 3 of 5)

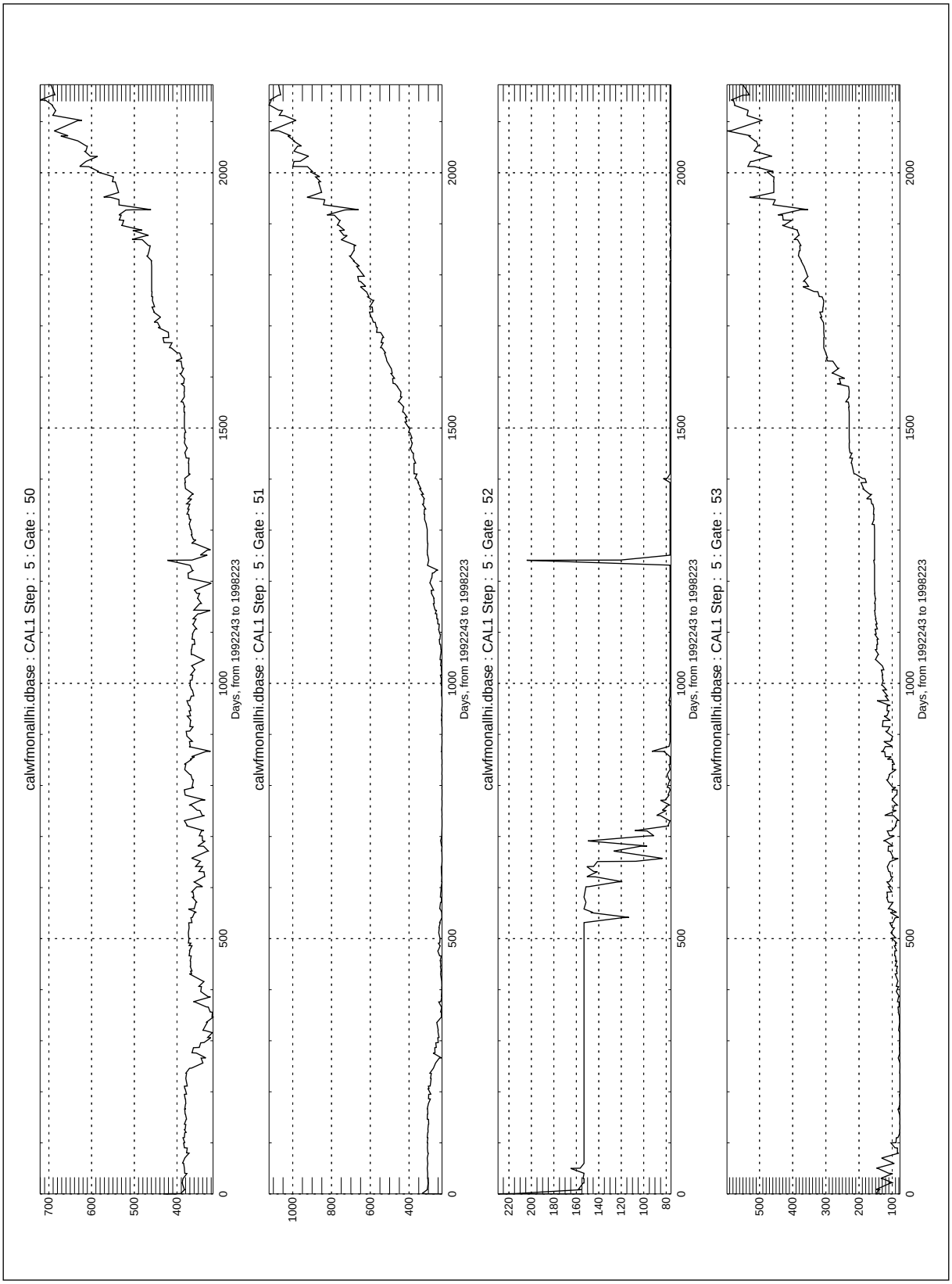

Figure A-15 Cal1 Step Waveform Trend Plot (Pg. 4 of 5)

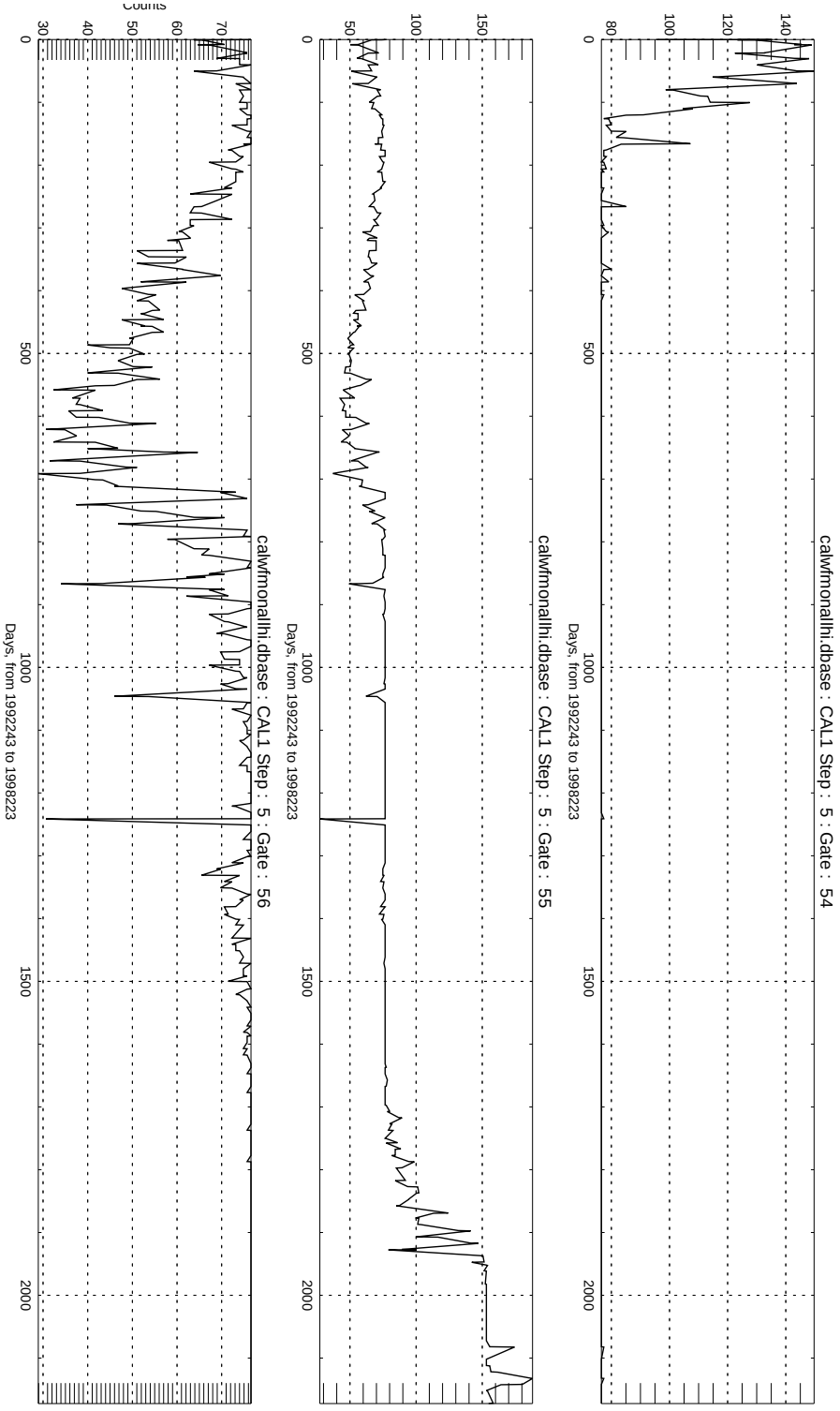

Figure A-16 Cal1 Step Waveform Trend Plot (Pg. 5 of 5)

Appendix B
Software Matrix

Table B-1 AIF Software Matrix

Software	Data Source	Products	Description
aifcal	CAL (Avg or DB)	Daily CAL Plot (Figure A-3)	UNIX script that runs IDL aifcal.pro. Creates Daily CAL plots.
aifeng	ENG (Avg or DB)	ENG Plot (Special)	UNIX script that runs IDL aifeng.pro. Creates special ENG plots displaying ALL parameters.
aifhdr	DB Header & Events	Process Summary (Figure A-2)	UNIX script that runs IDL aifhdr.pro
aifsci	SCI Avg	Science Plot (Figure A-5)	UNIX script that runs IDL aifsci.pro
alldbcal	CAL DB	CAL Plot (Special)	UNIX script that runs IDL allaifcal.pro. Creates special CAL plots displaying ALL steps.
autoaif	Current Date or User-Specified Date	Daily Products (Figure A-1 through A-7)	UNIX script automatically invoked by the crontab facility that performs all AIF daily processing. (FTP)
autoaifdni	Current Date	Daily Products (Figure A-1 through A-7)	Old version of autoaif that used DECNET to copy AIFs rather than FTP.
clkconvert	User Input	Converted Time (Displayed Only)	FORTRAN program that converts hexadecimal spacecraft clock time into seconds.
dailyeng	ENG Avg	Daily ENG Plot (Figure A-4)	UNIX script that runs IDL dailyeng.pro. Creates Daily ENG plots.
dailywf	WFDiff	Daily WFDiff Plot (Figure A-6)	UNIX script that runs IDL wfdiff.pro. Creates Daily WFDIFF plots.
dbcal	CAL DB	DB CAL Plot (Figure A-8)	UNIX script that runs IDL aifcal.pro. Creates Launch-to-Date CAL plots.
dbeng	ENG DB	DB ENG Plot	UNIX script that runs IDL aifeng.pro. Creates Launch-to-Date ENG Plots.

Table B-1 AIF Software Matrix (Continued)

Software	Data Source	Products	Description
dbwf	WF DB	DB WF Plot (Figure A-10)	UNIX script that runs IDL wfdiff.pro. Creates Launch-to-Date WFDIFF plots
dotelem	AIF SCI & ENG Files	DB Header Events DB/QuickCAL DB/Avg ENG DB/Avg WFDiff Avg Waveforms Avg Science Science Dump ENG Dump	Main TOPEX WFF AIF processing program. Coded in FORTRAN.
finishaif	Current Date or User-Specified Date	Daily Products (Figure A-1 through A-7)	UNIX script that performs the same functions as autoaif, with the exception of copying the AIF files from JPL.
fittpx3	WF Avgs	See Attached Memo GSH 7/21/93.	See Attached Memo GSH 7/21/93.
launchtodate	Launch-to-Date DBs	Launch-to-Date Database Plots (Figures A-8 through A-11)	UNIX script that runs IDL dbcal, dbeng, & dbwf.
lsjplaif	none	List of AIF files (Display Only)	UNIX script that automatically runs an FTP session to list AIF files available at JPL.
mtopexautowf	WF Avgs	Modified WF Plots (Special)	UNIX script that runs IDL mtopexautowf.pro. Creates autoscaled waveform plots modified as requested by GSH.
mtopexwf	WF Avgs	Modified WF Plots (Special)	UNIX script that runs IDL mtopexwf.pro. Creates fix-scaled waveform plots modified as requested by GSH.
stdaif	Current Date or User-Specified Date	Daily Products (Figure A-1 through A-7)	UNIX script that performs the same functions as autoaif, with the exception of creating and concatenating database files. Useful for automatically processing special data from JPL.
topexautowf	WF Avgs	WF Plots (Figure A-11)	UNIX script that runs IDL mtopexwf.pro. Creates autoscaled waveform plots.

Table B-1 AIF Software Matrix (Continued)

Software	Data Source	Products	Description
topexseu	DataFile.SEU	SEU Plot (Figure A-13)	UNIX script that runs IDL topex-seu.pro. Creates SEU plots.
topexwf	WF Avgs	WF Plots (Special)	UNIX script that runs IDL topexwf.pro. Creates fix-scaled waveform plots.
wfdiff	WF Diffs	WFDiff Plots (Figure A-6)	UNIX script that runs IDL wfdiff.pro. Creates WFDIFF plots.
wfdiffall	WF Diffs	WFDiff Plots (Special)	UNIX script that runs IDL wfdiff.pro. Creates WFDIFF plots with ALL steps.

Appendix C
File & Database Contents

This appendix documents file and database formats used in AIF processing. By definition, database files will be SPACE-delimited, while average files are TAB delimited.

Table C-1 AIF Header Database Format

Field	Fmt	Units	Description
hdrid	I4	n/a	
day	I7	YYYYDDD	Year and Julian Day
altoper	A1	n/a	Altimeter Operating (A/B)
kuon	A3	n/a	Operating Status of Ku-Band (ON/OFF)
con	A3	n/a	Operating Status of C-Band (C32/C10/OFF)
dateproc	A9	n/a	Date Data was Processed at WFF
wffprg	A15	n/a	WFF Software Used to Process Data
wffvers	A15	n/a	Version of WFF Software Used to Process Data
telemvers	A15	n/a	Version of DataFile.TelemDriver Used to Process Data
eavers	A15	n/a	Version of DataFile.EALimits Used to Process Data
romvers	A15	n/a	Version of DataFile.ROMMap Used to Process Data
badeng	I4	records	Number of Bad Engineering Records Detected
badsci	I4	records	Number of Bad Science Records Detected
trackhrs	F5.2	Hours	Number of Track-Mode Hours
scilost	F8.1		
englost	F8.1		

Table C-2 AIF CAL Database/QuickCAL Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
day	I7	YYYYDDD	Year and Julian Day
wffid	I2	n/a	Database Link
hdrid	I2	n/a	Database Link
step	I2	n/a	CAL Step (~16, 20 = CAL2)
mode	A4	n/a	Mode (CAL1/CAL2)
numrec	I4	records	Number of Records Used to Compute Averages
deltahgtku	F8.4	∆mm	Computed Average HgtKu - Reference (TempCorr)
deltahgtc	F8.4	∆mm	Computed Average HgtC - Reference (TempCorr)
deltaagcku	F8.4	∆dB	Computed Average AGCKu - Reference (TempCorr)
deltaagcc	F8.4	∆dB	Computed Average AGCC - Reference (TempCorr)
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-3 AIF Events Report Format

Field	Fmt	Units	Description
day	I7	YYYYDDD	Year and Julian Day
utcsec	F13.2	n/a	UTC Seconds
ATB	A17	n/a	Full UTC ASCII Time
EventSource	A3	n/a	Source of Event (SCI/ENG)
EventClass	A6	n/a	Level of Event Severity (Danger/Warn/Status, etc)
Description	A??	n/a	Description of Event

Table C-4 AIF ENG Database/Eng Averages Format

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
day	I7	YYYYDDD	Year and Julian Day
wffid	I2	n/a	Database Link
hdrid	I2	n/a	Database Link
mode	A4	n/a	Mode
numrec	I4	records	Number of Records Used to Compute Averages
value	A4	n/a	Type of Statistic (Min/Max/Mean)
temp01	F6.2	DegC	Statistic for Temp Monitor - spare
temp02	F6.2	DegC	Statistic for AGC Receiver Section Temp
temp03	F6.2	DegC	Statistic for SSU Temp
temp04	F6.2	DegC	Statistic for Ku MTU IF Preamp Temp
temp05	F6.2	DegC	Statistic for Receiver IQ Video Section Temp
temp06	F6.2	DegC	Statistic for TWTA EPC Temp #1
temp07	F6.2	DegC	Statistic for Temp Monitor - spare
temp08	F6.2	DegC	Statistic for C MTU Cal Attenuator Temp
temp09	F6.2	DegC	Statistic for C MTU RF Preamp Temp
temp10	F6.2	DegC	Statistic for C MTU IF Preamp Temp
temp11	F6.2	DegC	Statistic for C MTU Power Monitor Temp
temp12	F6.2	DegC	Statistic for C-SSA GaAs FETS Temp
temp13	F6.2	DegC	Statistic for C-SSA Power Converter Temp
temp14	F6.2	DegC	Statistic for Ku MTU Cal Attenuator Temp
temp15	F6.2	DegC	Statistic for Ku MTU Power Monitor Temp
temp16	F6.2	DegC	Statistic for UCFM Temp
temp17	F6.2	DegC	Statistic for Ku MTU RF Preamp Temp
temp18	F6.2	DegC	Statistic for Downconverter Temp
temp19	F6.2	DegC	Statistic for Signal Proc DFB Butterfly Brd Temp
temp20	F6.2	DegC	Statistic for Signal Proc DFB Memory Temp
temp21	F6.2	DegC	Statistic for Signal Proc ICA Condition Amps Temp
temp22	F6.2	DegC	Statistic for Signal Proc A/D Converter Temp
temp23	F6.2	DegC	Statistic for Signal Proc Synchronizer Temp

Table C-4 AIF ENG Database/Eng Averages Format (Continued)

Field	Fmt	Units	Description
temp24	F6.2	DegC	Statistic for Signal Proc ATA Temp
temp25	F6.2	DegC	Statistic for Signal Proc Housing Wall Temp
temp26	F6.2	DegC	Statistic for Digital Chip Generator Gate Array Temp
temp27	F6.2	DegC	Statistic for LVPS Mounting Plate Temp
temp28	F6.2	DegC	Statistic for LVPS Boost Regulator Assembly Temp
mon01	F10.6	Volts	Statistic for LVPS +12V
mon02	F10.6	Volts	Statistic for LVPS +28V
mon03	F10.6	Volts	Statistic for LVPS +15V
mon04	F10.6	Volts	Statistic for LVPS -15V
mon05	F10.6	Volts	Statistic for LVPS +5V (5%)
mon06	F10.6	Volts	Statistic for LVPS +5V (1%)
mon07	F10.6	Volts	Statistic for LVPS -5.2V
mon08	F10.6	Volts	Statistic for LVPS -6V
mon09	F10.6	Watts	Statistic for Ku Xmit Power (TempCorr)
mon10	F10.6	Volts	Statistic for TWTA Cathode Voltage
mon11	F10.6	Amps	Statistic for TWTA Cathode Current (TempCorr)
mon12	F10.6	Amps	Statistic for TWTA Helix Current
mon13	F10.6	Amps	Statistic for TWTA Bus Current
mon14	F10.6	Watts	Statistic for C Xmit Power
mon15	F10.6	dBm	Statistic for C-SSA Input RF Power (TempCorr)
mon16	F10.6	Amps	Statistic for C-SSA Bus Current (TempCorr)
mon17	F10.6	Amps	Statistic for LVPS Bus Current
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-5 AIF Waveform Differences Database/Check WF Format

Field	Fmt	Units	Description
utcsec	F16.2	seconds	Average UTC Seconds
day	I7	YYYYDDD	Year and Julian Day
mode	A4	n/a	Mode
numrec	I4	rewcords	Number of Records Used to Compute Averages
gate01	F7.2	Δcounts	Computed WF Gate #1 Average - Reference
gate02	F7.2	Δcounts	Computed WF Gate #2 Average - Reference
gate03	F7.2	Δcounts	Computed WF Gate #3 Average - Reference
gate04	F7.2	Δcounts	Computed WF Gate #4 Average - Reference
. . .	. . .	. . .	. . .
gate61	F7.2	Δcounts	Computed WF Gate #61 Average - Reference
gate62	F7.2	Δcounts	Computed WF Gate #62 Average - Reference
gate63	F7.2	Δcounts	Computed WF Gate #63 Average - Reference
gate64	F7.2	Δcounts	Computed WF Gate #64 Average - Reference
temp01	F7.2	degC	Mean of AGC Receiver Section Temperature

Table C-6 DataFile.SEU Format

Field	Fmt	Units	Description
ATB	A17	n/a	Full UTC ASCII Time of SEU
Latitude	F6.2	degrees	Latitude of SEU
Longitude	F6.2	degrees	Longitude of SEU
TypeRST	A1	n/a	Type of Reset (A=Automatic, M=Manual)
ATB-MAN	A17	n/a	Time of Manual Reset
HoursLost	F6.2	Hours	Number of Track Hours Lost due to Reset
Mode	A4	n/a	Altimeter Mode Prior to Reset
Description	n/a	n/a	Description of Reset

Table C-7 AIF Waveform Averages Format

Field	Fmt	Units	Description
utcsec	F16.2	seconds	Average UTCSeconds
ATB	A17	n/a	Full UTC ASCII Time
year	A3	n/a	Last 3 Digits of Year
day	A3	n/a	Julian Day of Year
step	I4	n/a	CAL Mode Step (Valid only if Mode=CAL1)
mode	A4	n/a	Mode
numrec	I4	records	Number of Records Used to Compute Averages
gateindex	I4	n/a	Computer Gate Index Average
vswh	F14.2	counts	Computed VSWH Average
finehgt	F14.2	mm	Computed Fine Height Average
gate01	F14.2	counts	Computed WF Gate #1 Average
gate02	F14.2	counts	Computed WF Gate #2 Average
gate03	F14.2	counts	Computed WF Gate #3 Average
gate04	F14.2	counts	Computed WF Gate #4 Average
. . .	. . .	. . .	. . .
gate61	F14.2	counts	Computed WF Gate #61 Average
gate62	F14.2	counts	Computed WF Gate #62 Average
gate63	F14.2	counts	Computed WF Gate #63 Average
gate64	F14.2	counts	Computed WF Gate #64 Average

Table C-8 AIF Sci Averages Format

Field	Fmt	Units	Description
time	F13.2	seconds	Average UTC Seconds
UTC	A17	YYYYDDD	Year and Julian Day
Day	A7	n/a	Database Link
numrec	I4	records	Number of Records Used to Compute Averages
worstmode	A4	n/a	Worst Mode Detected in Interval
bestmode	A4	n/a	Best Mode Detectewd in Interval
Landwater	F6.4	n/a	unused
Latitude	F7.3	n/a	unused
Longitude	F7.3	n/a	unused
HgtKuRMS	F9.2	mm	RTMS of AltHgtKu, computed with Hayne Method
HgtDiffRMS	F9.2	mm	RMS of AltHgtKu-C, computed with Hayne Method
AltHgtKu	F9.2	meters	Average of AltHgtKu
HgtDiff	F6.2	meters	Average of AltHgtC-AltHgtKu
SWHKu	F6.2	meters	Average of SWHKu
SWHC	F6.2	meters	Average of SWHC
VSWHKu	F6.2	counts	Average of VSWHKu
VSWHC	F6.2	counts	Average of VSWHC
AGCKu	F5.2	dB	Average of AGCKu (TempCorr)
AGCC	F5.2	dB	Average of AGCC (TempCorr)
HgtRate	F6.2	meters/sec	Average of AltHgtRate
GateIndexKu	F6.2	n/a	Average of GateIndexKu
GateIndexC	F6.2	n/a	Average of GateIndexC
AttEstWF	F6.2	n/a	Average of AttEstWF
SciQuality	I4	flags	Number of ALL recs with T1016 AGC, SWH, or Hgt Flags
IntertQuality	I4	n/a	unused
LimitByte	I4	flags	Number of ALL Records with LimitByte $\neq 0$
ModeFlag	I4	flags	Number of ALL Recs with FlgMode1068 or FlgTrack1068
OOEFlag	I4	flags	unused
OrderFlag	I4	flags	unused
FlgBln1016C	I4	flags	Number of ALL Heights with FlgBln1016C

Table C-8 AIF Sci Averages Format (Continued)

Field	Fmt	Units	Description
FlgBln1016K	I4	flags	Number of ALL Heights with FlgBln1016Ku
FlgEaHgtC	I4	flags	Number of ALL Heights with FlgEaHgt1016C
FlgEaHgtK	I4	flags	Number of ALL Heights with FlgEaHgt1016Ku
FlgVAttKu	I4	flags	Number of GOOD Raecords with FlgVAttKu
FlgVAttC	I4	flags	Number of GOOD Records with FlgVAttC
UTCConv	I4	n/a	unused
FlgHi5110	I4	flags	Number of GOOD Waveforms with FlgHi5110
FlgLo5110	I4	flags	Number of GOOD Waveforms with FlgLo5110
useflag	L1	n/a	Settable Flag Used for Ignoring Bad Data

Table C-9 AIF ENG Dump Format

Field	Fmt	Units	Description
engrec	I4	n/a	Engineering Record Number
ATB	A17	n/a	Full UTC ASCII time
clktime	F16.4	seconds	Time of Spacecraft On-Board Clock
utctime	F16.4	seconds	UTC Seconds
timerst	F16A	seconds	Time of Last Reset
EngAltOper	A1	n/a	Altimeter Currently operating (A/B)
ChkSum	2A2	n/a	Engineering Memory Checksum (in hex)
EngMode	A4	n/a	Current Mode
BiLevels	2A2	n/a	BiLevel Words (in Hex)
LastCMD1	A17	n/a	Last command #1, Type, Command, Status
LastCMD2	A17	n/a	Last Command #2, Type,Command, Status
LastCMD3	A17	n/a	Last Command #3, Type, Command, Status
LastCMD4	A17	n/a	Last Command #4, Type, Command, Status
LastCMD5	A17	n/a	Last Command #5, Type, Command, Status
LastCMD6	A17	n/a	Last Command #6, Type, Command, Status
LastCMD7	A17	n/a	Last Command #7, Type, Command, Status
LastCMD8	A17	n/a	Last Command #8, Type, Command, Status
MemAddr	2A2	n/a	Memory Dump Address (in Hex)

Table C-9 AIF ENG Dump Format (Continued)

Field	Fmt	Units	Description
MemDump	32A2	n/a	Memory Dump (in Hex)
temp01	F6.2	DegC	Average of Temp Monitor - spare
temp02	F6.2	DegC	Average of AGC Receiver Section Temp
temp03	F6.2	DegC	Average of SSU Temp
temp04	F6.2	DegC	Average of Ku MTU IF Preamp Temp
temp05	F6.2	DegC	Average of Receiver IQ Video Section Temp
temp06	F6.2	DegC	Average of TWTA EPC Temp #1
temp07	F6.2	DegC	Average of Temp Monitor - spare
temp08	F6.2	DegC	Average of C MTU Cal Attenuator Temp
temp09	F6.2	DegC	Average of C MTU RF Preamp Temp
temp10	F6.2	DegC	Average of C MTU IF Preamp Temp
temp11	F6.2	DegC	Average of C MTU Power Monitor Temp
temp12	F6.2	DegC	Average of C-SSA GaAs FETs Temp
temp13	F6.2	DegC	Average of C-SSA Power Converter Temp
temp14	F6.2	DegC	Average of Ku MTU Cal Attenuator Temp
temp15	F6.2	DegC	Average of Ku MTU Power Monitor Temp
temp16	F6.2	DegC	Average of UCFM Temp
temp17	F6.2	DegC	Average of Ku MTU RF Preamp Temp
temp18	F6.2	DegC	Average of Downconverter Temp
temp19	F6.2	DegC	Average of Signal Proc DFB Butterfly Brd Temp
temp20	F6.2	DegC	Average of Signal Proc DFB Memory Temp
temp21	F6.2	DegC	Average of Signal Proc ICA Condition Amps Temp
temp22	F6.2	DegC	Average of Signal Proc A/D Converter Temp
temp23	F6.2	DegC	Average of Signal Proc Synchronizer Temp
temp24	F6.2	DegC	Average of Signal Proc ATA Temp
temp25	F6.2	DegC	Average of Signal Proc Housing Wall Temp
temp26	F6.2	DegC	Average of Digital Chip Generator Gate Array Temp
temp27	F6.2	DegC	Average of LVPS Mounting Plate Temp
temp28	F6.2	DegC	Average of LVPS Boost Regulator Assembly Temp
mon01	F10.6	Volts	Average of LVPS +12V

Table C-9 AIF ENG Dump Format (Continued)

Field	Fmt	Units	Description
mon02	F10.6	Volts	Average of LVPS +28V
mon03	F10.6	Volts	Average of LVPS +15V
mon04	F10.6	Volts	Average of LVPS -15V
mon05	F10.6	Volts	Average of LVPS +5V (5%)
mon06	F10.6	Volts	Average of LVPS +5V (1%)
mon07	F10.6	Volts	Average of LVPS -5.2V
mon08	F10.6	Volts	Average of LVPS -6V
mon09	F10.6	Watts	Average of Ku Xmit Power (TempCorr)
mon10	F10.6	Volts	Average of TWTA Cathode Voltage
mon11	F10.6	Amps	Average of TWTA Cathode Current (TempCorr)
mon12	F10.6	Amps	Average of TWTA Helix Current
mon13	F10.6	Amps	Average of TWTA Bus Current
mon14	F10.6	Watts	Average of C Xmit Power
mon15	F10.6	dBm	Average of C-SSA Input RF Power (TempCorr)
mon16	F10.6	Amps	Average of C-SSA Bus Current (TempCorr)
mon17	F10.6	Amps	Average of LVPS Bus Current
useflag	L1	n/a	Settable Flag used For Ignoring Bad Data

Table C-10 AIF SCI Dump Format

Field	Fmt	Units	Description
scirec	F8.2	n/a	Science Record Number
synctime	F16.4	seconds	Time used by Science/Engineering Synchronization
sciclk	F16.4	seconds	time of Spacecraft On-Board Clock
sciutc	F16.4	records	UTC seconds
ATB	A17	n/a	Full UTC ASCII Time
AltOper	A1	n/a	Current Altimeter Operating (A/B)
KuOn	A3	n/a	State of Ku-Band (ON/OFF)
COn	A3	n/a	State of C-Band (C10/C32/OFF)
WFFreqHi	A2	n/a	High Rate Frequency (Ku/C)
WFFreqLo	A2	n/a	Low Rate Frequency (Ku/C)

Table C-10 AIF SCI Dump Format

Field	Fmt	Units	Description
Mode	A4	n/a	Current Mode
Track	A4	n/a	Current Track Type
AGCType	A4	n/a	Current AGC Type
Step	I4	n/a	Current CAL Step (Only Valid if Mode=CAL1)
GateIndexKu	I4	n/a	GateIndexKu
GateIndexC	I4	n/a	GateIndexC
CALAttenK	I4	n/a	CAL Attenuator Setting Ku
CALAttenC	I4	n/a	CAL Attenuator Setting C
CurrMode	I8	n/a	Interger Value of Current Mode Byte
ModeChg	I8	n/a	Integer Value of Mode Change Byte
SynchMode	I8	n/a	Integer Value of Sync Mode Byte
LimitByte	I8	n/a	Integer Value of Limit Byte
TestMode	I8	n/a	Integer Value of Test Mode Byte
OperMode	I8	n/a	Integer Value of Operation Mode Byte
LastATA	A8	n/a	Last ATA Command Received
LastICA	A8	n/a	Last ICA Command Received
AltHgtKu	F16.4	mm	AltHgtKu
AltHgtC	F16.4	mm	AltHgtC
AGCKu	F16.4	dB	Average of AGCKu (TempCorr)
AGCC	F16.4	dB	Average of AGCC (TempCorr)
HgtRate	F16.4	meters/sec	Average of AltHgtRate
SWHKu	F16.4	meters	SWHKu
SWHC	F16.4	meters	SWHC
VSWHKu	F16.4	counts	VSWHKu
VSWHC	F16.4	counts	VSWHC
HgtRate	F16.4	meters/sec	AltHgtRate

Table C-11 AIF Cal Waveform Monitor Database

Field	Fmt	Units	Description
utcsec	F13.2	seconds	Average UTC Seconds
fileid	A7	YYYYDDD	Year and Julian Day
wffid	I2	n/a	
hdrid	I2	n/a	
step	I2	n/a	CAL1 Step (16)
mode	A4	n/a	Mode CAL1 only
reccount	F4.0	records	Number of Records Used to Compute Averages
Height	F16.4	mm	Altimeter Height
AGC	F8.4	db	Average of AGC
Temp	F8.4	degC	Mean of AGC Receiver Section Temperature
gate01	F14.3	Scaled	WF Gate #1 Step Average
gate02	F14.3	Scaled	WF Gate #2 Step Average
gate03	F14.3	Scaled	WF Gate #3 Step Average
gate04	F14.3	Scaled	WF Gate #4 Step Average
. . .	. . .	. . .	. . .
gate61	F14.3	Scaled	WF Gate #61 Step Average
gate62	F14.3	Scaled	WF Gate #62 Step Average
gate63	F14.3	Scaled	WF Gate #63 Step Average
gate64	F14.3	Scaled	WF Gate #64 Step Average

Appendix D

Plots of Reference Values

This appendix contains plots of the reference values used during AIF processing. These plots were generated by an IDL program that reads DataFile.EALimits and extracts from it the CAL and Waveform references.

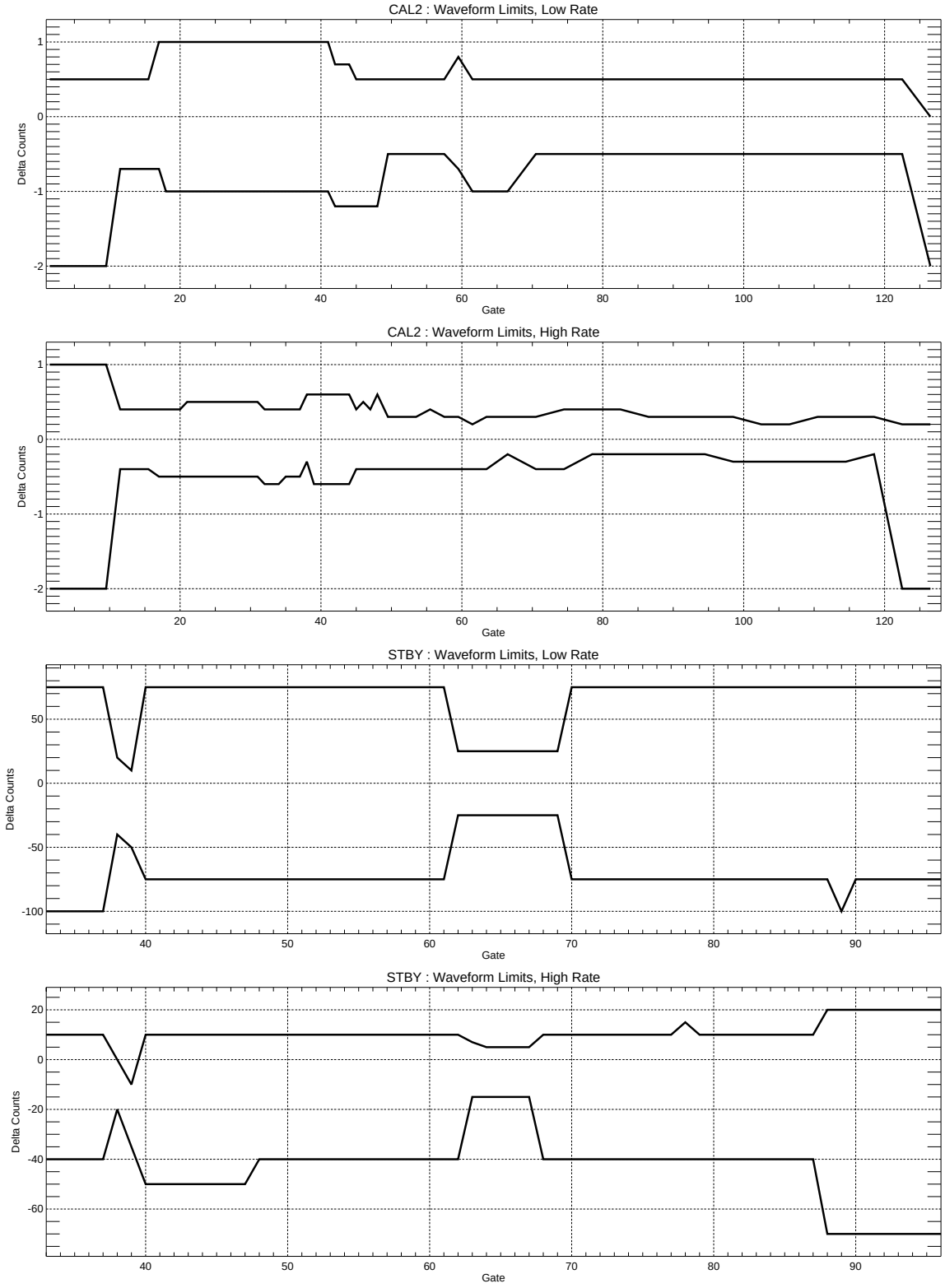

Figure D-1 CheckWF Waveform Limits

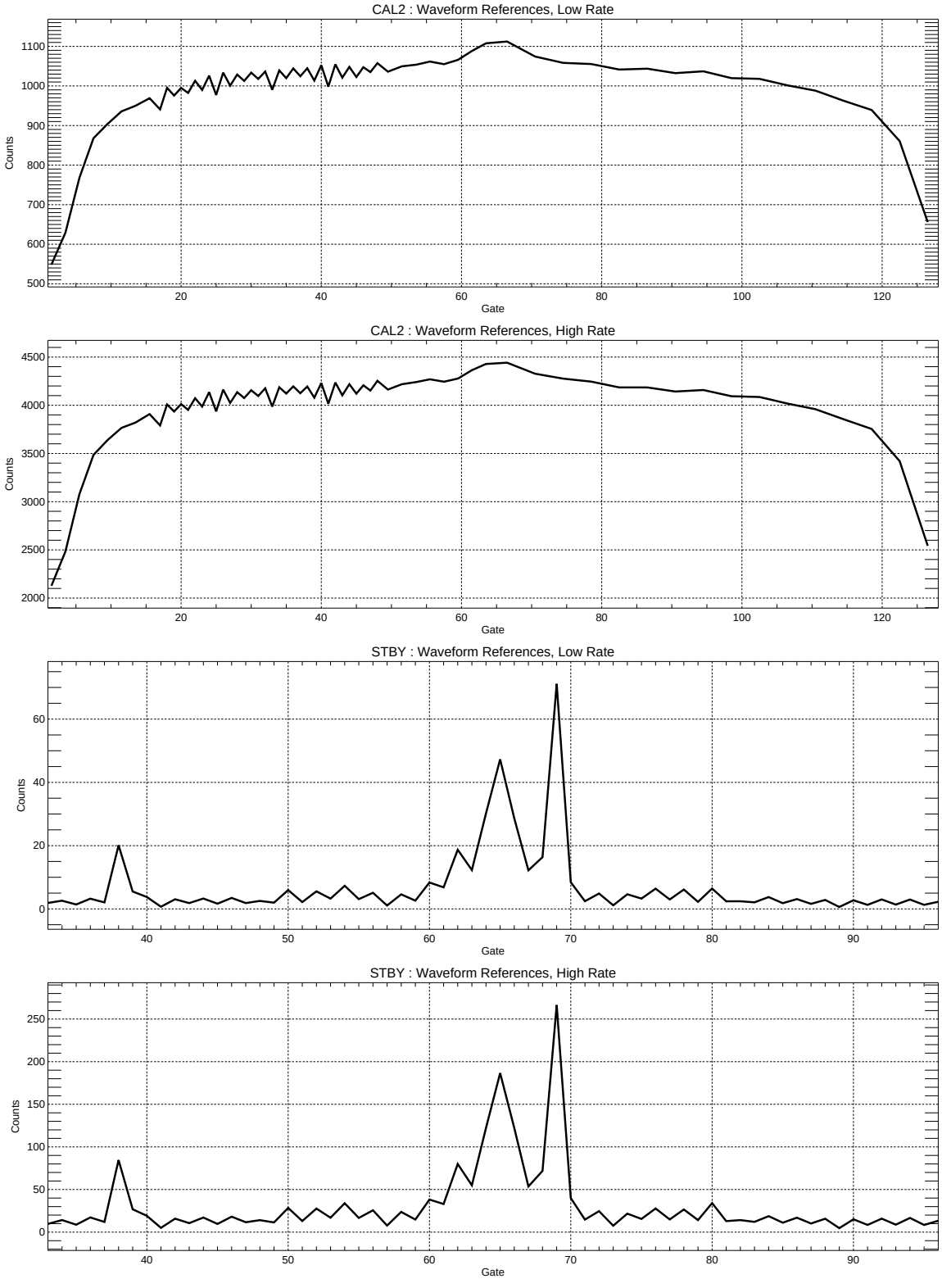

Figure D-2 CheckWF Waveform References

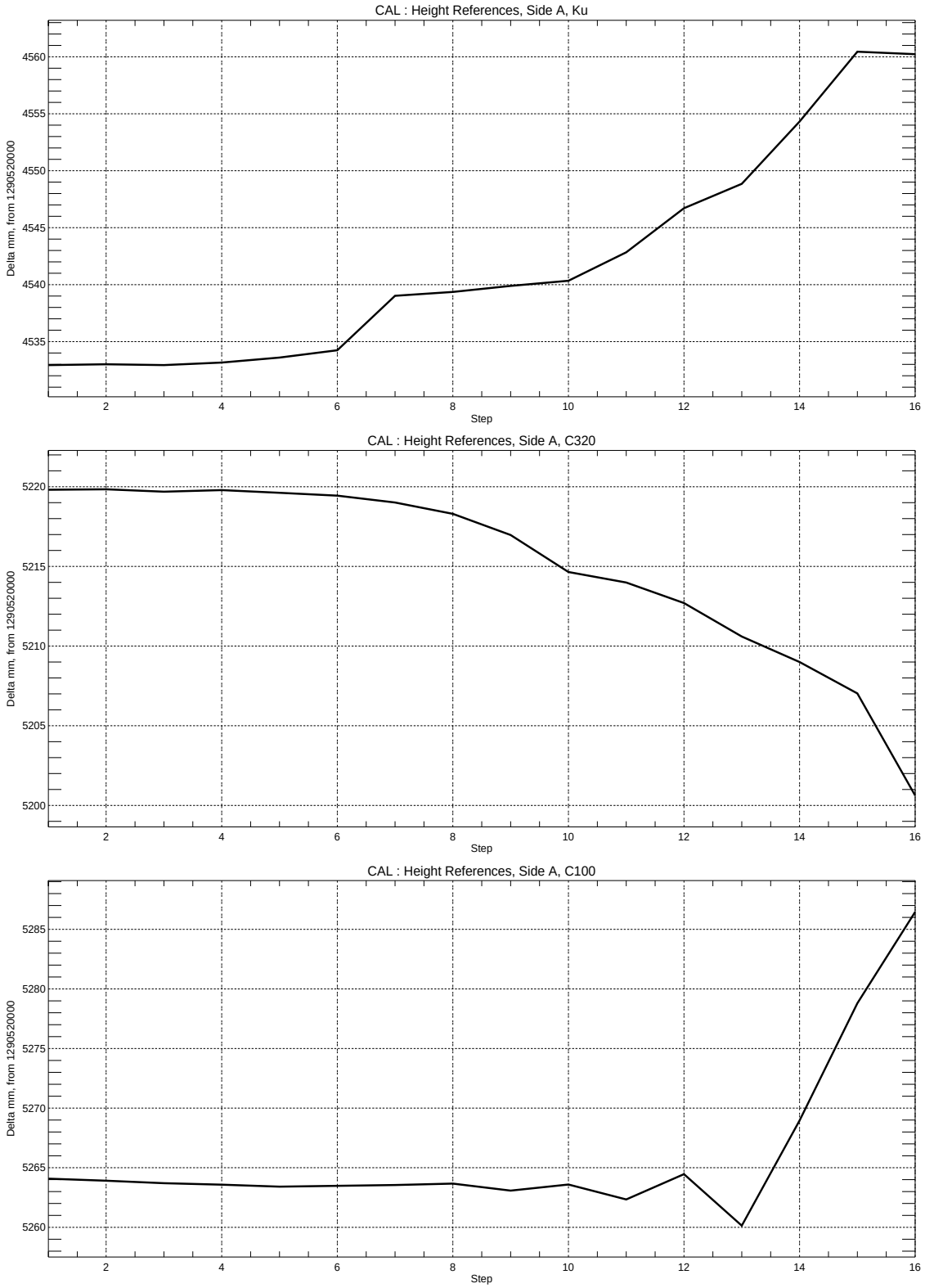

Figure D-3 QuickCAL Height References, Side A

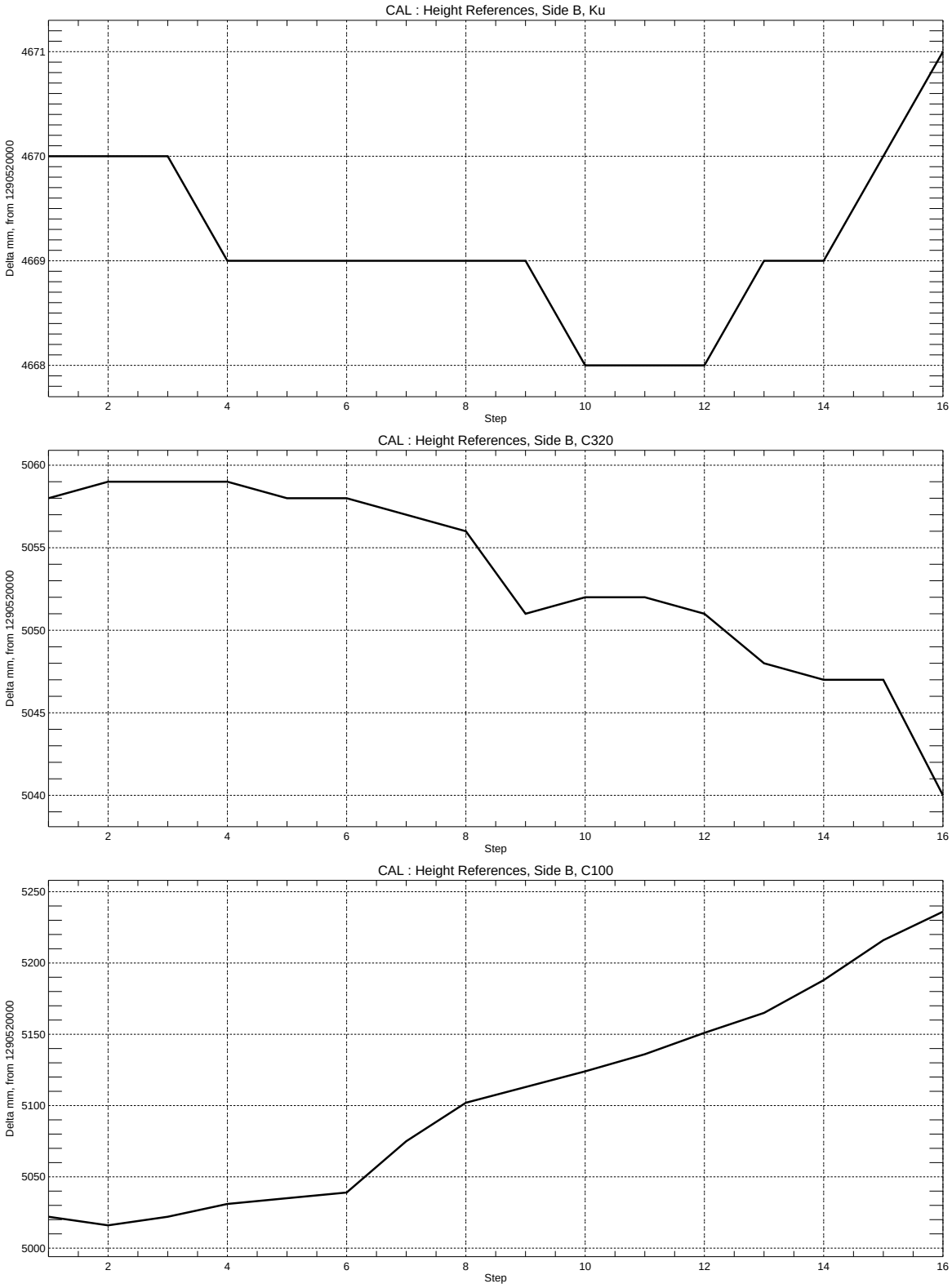

Figure D-4 QuickCAL Height References, Side B

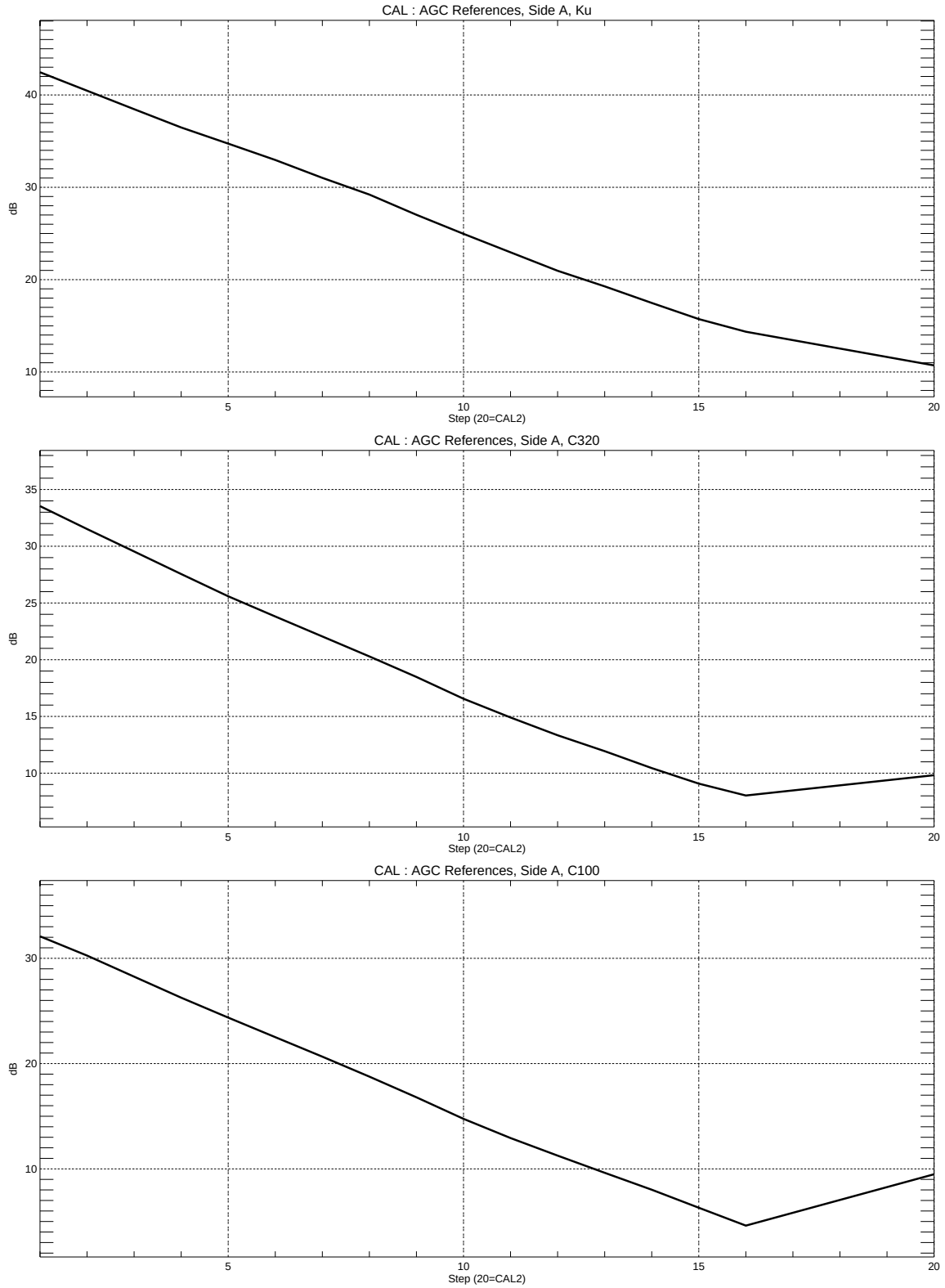

Figure D-5 QuickCAL AGC References, Side A

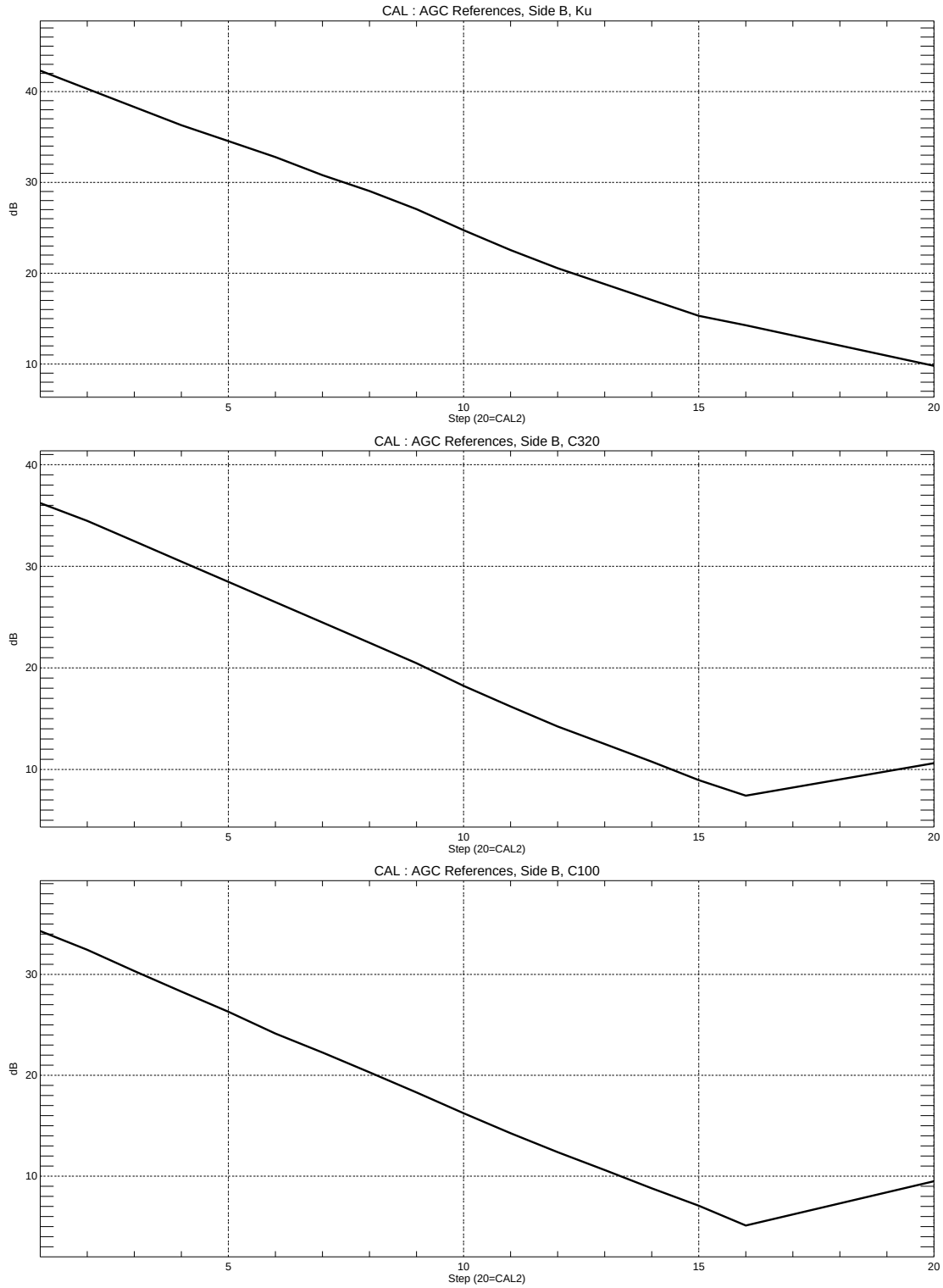

Figure D-6 QuickCAL AGC References, Side B

Appendix E
AIF Software

Table E-1 AIF Software Change History

Date	First Data Affected	Related Requests	Software Component(s)	New Version	Description of Changes
06/07/93	1992234		dotelem	3.0, 03/01/93	Baseline Version. Includes CAL1 Attenuator temperature correction.
			DataFile.TelemDriver	13.0 ,05/11/93	Baseline version.
			DataFile.EALimits	6.0, 05/25/93	Baseline version.
			DataFile.ROMMap	1.2, 11/30/92	Baseline version.
06/09/93	1993120		dotelem	3.2 ,05/18/93	New Height RMS method implemented (see Hayne/Brooks memos). Some previous data were reprocessed with the new version of dotelem.
08/03/93	1993214	93/233	dotelem	3.3, 07/20/93	Fix T3117 AGC Temperature corrections problem.
			aifcal.pro	n/a	Reduced number of daily CAL plots.
			DataFile.EALimits	6.0, 08/17/93	Fix AGC CAL Reference values to match new data to previous uncorrected AGCs.
08/10/93	n/a	93/234	aifeng.pro	n/a	Add delta transmit power plots to Launch-to-Date engineering package.
09/08/93	n/a	93/260	aifeng.pro aifcal.pro	n/a	Change labeling on Launch-to-Date plots.
10/01/93	AIF Processing Officially Placed Under Change Control, Memo 10/01/93, H. Gordon				
12/09/93	1993342	93/280	dotelem	3.4, 12/08/93	Fix memory check logic.
		93/279	DataFile.ROMMap	1.3, 12/08/93	Add Pulse Count Refresh patch to Memory Map.
		93/299	getjplbin	n/a	Switched from DECNET to FTP protocols for data transfer from JPL.

Table E-1 AIF Software Change History (Continued)

Date	First Data Affected	Related Requests	Software Component(s)	New Version	Description of Changes
01/27/94	1994026	94/007 94/010	dotelem	3.5 ,01/25/94	Add waveform monitoring and report time_last_reset in hex.
			aifhdr.pro readevents.pro	n/a	Print time_last_reset in hex..and number of resets per day.
			aifcal.pro	n/a	Plot only last 14 days of CAL steps by gate.
			DataFile.EALimits	07 ,01/26/94	Add waveform monitoring parameters.
			dailywf,wfdiff,wfdif-fall,wfdiff.pro,reade-vents.pro,aifhdr.pro	n/a	Created idl code and unix script to plot waveform differences.
			dailyaif, finishaif, stdaif	n/a	Modified unix script to support standard waveform difference processing.
			topexigdr.prg, wfhi.dbase, wflo. dbase	n/a	Waveform databases created & database code modified to support same.
03/31/94	1994025	94/009	DataFile.CMD	n/a	Added new mnemonics.
09/16/94	1994264	94/115	dotelem	3.6, 9/16/94	Corrected full-rate waveform averages problem. Implemented new Hayne CAL processing. ALL DATA WAS PREPROCESSED.
		94/134	DataFile.EALimits	8.0, 09/16/94	Added Side B AGC temperature correction coeffi-cients
02/15/95	1995046	94/045	dotelem	4.0, 02/10/95	Added CACQ processing, PassCount processing, and improved memory comparison.
			DataFile.EALimits	l0.0, 02/10/95	Added constants for CACQ processing & memory comparison.
			DataFile.ROMMap	2.0, 02/10/95	Added new memory locations to map.

Appendix F
Attachments

Table F-1 List of Attachments

Date	Author(s)	Subject
October 1998	J.Lee/D. Lockwood	JPL SPAT Display Instructions (Revised)
October 1998	J.Lee/D. Lockwood	AIF Retrieval & STANDARD Processing Instructions (Revised)
October 1998	J.Lee/D. Lockwood	SPECIAL Processing Instructions (Revised)
March 4, 1993	G.S. Hayne	Estimating Ku Range Noise
June 21, 1993	G.S. Hayne	TOPEX Waveform Fitting Program fittpx
September 29., 1993	G.S. Hayne	Needed Corrections to TOPEX Waveform Fitting Program fittpx
October 1, 1993	H. Gordon	Change Control Status ffor AIF Processing Module
October 1, 1993	J. Lee, D. Lockwood	AIF Processing
October 6, 1993	J. Lee	Suggested Correction to AIF Processing
December 9, 1993	H. Gordon	EA S/W Change 4: Memory map
December 9, 1993	H. Gordon	EA S/W Change 5: Memory Dump Address
December 9, 1993	J. Lee, D. Lockwood	Emergency TOPEX AIF Processing change request
December 9, 1993	H. Gordon	EA S/W Change 6: JPL/WFF File Transfer
December 9, 1993	J. Lee, D. Lockwood	Final JPL SPAT Displays and Instrument File Retrieval & Processing Instructions
January 20, 1994	J. Lee, D. Lockwood	RE: Change Request for AIF Processing Module: CAL Plot Change
January 24, 1994	J. Lee, D. Lockwood	RE: Change Request for AIF Output of Last Time Reset - Revisited
January 25, 1994	J. Lee, D. Lockwood	RE: Request 94/010
January 25, 1994	J. Lee, D. Lockwood	RE: Request 94/007
January 25, 1994	J. Lee, D. Lockwood	RE: Request 94/008
January 25, 1994	J. Lee, D. Lockwood	RE: Request 94/011
February 1, 1994	H. Gordon	EA S/W Change 10: Last Reset Time of Day

Table F-1 List of Attachments (Continued)

Date	Author(s)	Subject
February 1, 1994	H. Gordon	EA S/W Change7: Waveform Monitoring
February 1, 1994	H. Gordon	EA S/W Change 8: SEU Monitoring
February 1, 1994	H. Gordon	EA S/W Change 11: CAL Plot Change
March 21, 1994	H. Gordon	EA S/W Change 9: Error Reset Mnemonics
May 26, 1994	R. Brooks, J. Lee	Temperature Corrections for Side-B CA-1 Ku and C AGC
May 27, 1994	J. Lee, D. Lockwood	Suggested Corrections to AIF Processing: Full Rate Waveforms
June 3, 1994	R. Brooks	Implementation of Temperature Correction Coefficients for Side-B CAL-1 Ku and C AGC
June 28, 1994	G.S. Hayne	Corrections to Range Bias Determined in TOPEX Calibration Mode 1
July 7, 1994	G.S. Hayne	Replacement Figure 3 for DRAFT Memo “Corrections to Range Bias Determined in TOPEX Calibration Mode 1” of 28 June 1994
September 21, 1994	H. Gordon	EA S/W Change 15: AIF Waveform Processing Correction
September 21, 1994	H. Gordon	EA S/W Change 20: Side B Temperature Correction Coeffs.
September 21, 1994	H. Gordon	EA S/W Change 19: New CAL Processor
January 17, 1995	J. Lee	RE: Request 94/193
February 24, 1995	J. Lee	Change Request 95/045

JPL SPAT Display Instructions

Note: Requests for ALT Science and Engineering instrument files should be directed to the TOPEX Data Analyst Office at 818/393-0701.

1. **Launch the TCP/Connect II** - click on its icon.
2. For EACH display you wish to view, perform steps 3 through 11.
3. Under **Terminal** on the menu bar at the top of the screen, select **Connect**.
4. In the **Session Name** text field, **type 128.149.96.13** and click the "**OK**" button.
5. Press the [return] key once to get TGSA's attention.

   User Name : (**opssys**) and press the [**return**] key at the Username: prompt.

   Password**:** (*?) and press the [**return**] key at the Password: prompt.
   (*Password cannot be published but must be obtained from a cognizant TOPEX team member.)

   Note: If there are errors made in entering username/password attempts, the jpl system will temporarily lockout user for a period of time. After an undetermined amount of time, the system will accept another attempt.

TCP/Connect II VT102 Emulation Keys	
VT102 Key	**Mac Keyboard**
enter	[enter] on numeric keypad
PF1	[clear] on numeric keypad
PF2	[=] on numeric keypad
PF3	[/] on numeric keypad
PF4	[*] on numeric keypad
KP0	[0] on numeric keypad
KP1	[1] on numeric keypad
KP2	[2] on numeric keypad
KP3	[3] on numeric keypad
KP4	[4] on numeric keypad
KP5	[5] on numeric keypad
KP6	[6] on numeric keypad
KP7	[7] on numeric keypad
KP8	[8] on numeric keypad
KP9	[9] on numeric keypad
KP.	[.] on numeric keypad

TCP/Connect II VT102 Emulation Keys	
VT102 Key	**Mac Keyboard**
Up	[ ] on cursor keypad
Down	[ ] on cursor keypad
Left	[ ] on cursor Keypad
Right	[ ] on cursor Keypad

6. Follow on-screen instructions until you get to the **TCCS MAIN MENU**.
7. Press the [**enter**] key on the **numeric keypad** to access the **TELEMETRY** menu.
8. Follow Step 9 to choose from a list of displays, or Step 10 to view a “standard” display.
9. Press the [**Down**] key three times to hilight **TLM3 VIEW CHANNEL DATA (LIST OF DISPLAYS).**

   Press the [**enter**] key on the numeric keyboard to select this choice.

   Press the [**KP.**] key.

   Type **SPAT*** in response to **Where DISPLAY_NAME is**.

   Press the [**PF3**] key to execute the query.

   Use the [**Up**] and [**Dow**n] keys to hilight the desired screen. Note: using the [Up] key to scroll backwards may produce strange results.

   Press the [**PF1**] then [**KP4**] keys to select your choice. The selected display should now be viewable on screen.
10. Press the [**Down**] key two times to hilight **TML2_1 VIEW CHANNEL DATA - DUAL COLUMN.**

    Press the [**enter**] key to select this choice.

    Press the [**KP.**] key. Type one of the following choices in response to **DISPLAY_NAME is**. For example, **SPAT-ALTAC**.

“Standard” Displays	
Name	**Description**
SPAT-ALTAC	ALT-A Command Words
SPAT-ALTAD	ALT-A Memory Dump
SPAT-ALTAP	ALT-A Powers
SPAT-ALTRS	S/C & RESET Times & SCI Word

Press the **PF1** and **KP4** keys to confirm your choice. The selected display should now be viewable on-screen.

11. You may move the display screen windows around by clicking on the title bar and dragging the mouse. The title bar is the area at the top of the window that contains "128.149.96.13" surrounded by faint lines.

12. To exit, for each window, "back-out" of TGS system by pressing subsequent [**PF1**] then [**KP0**] keys.

    Note: at screen bottom : At HOME level, now exiting. Are you sure (y/n):___[return].

13. Under **File** on the menu bar at the top of the screen, select **QUIT** to exit TCP/Connect II.

AIF Retrieval & STANDARD Processing Instructions

Note: Requests for ALT Science and Engineering instrument files should be directed to the TOPEX Data Analyst Office at 818/393-0701.

Definitions

UTC: Coordinated Universal Time. Time is represented in the format "YYYYDDDtHHMMSS", where YYYY represents year, DDD represents the Julian day of the year, and HHMMSS represents hours, minutes, and seconds. Eastern Standard Time = UTC Time - 5 hours. For example: 1993285t060203 represents October 12, 1993 at 01:02:03 EST.

fileutc: The UTC portion of a filename. JPL creates their AIF filenames by using the UTC of the start of the data.

filename: The name of a file. Standard filenames consist of a prefix, a ***fileutc***, and a suffix, where the prefix and suffix identify the file type.

Instructions

14. Log on to osb3 by doing the following:

    Select **TCP/Connect** - click on its icon

    Under **Terminal** on the menu bar at the top of the screen, select **Connect** .

    Session Name: **osb3** [select "**okay**"] (Note: It is not necessary to enter information for Window Name:)

    Login: (user **name**) [return]
    Pswd: (user **password**) [return]

15. Your path must be able to access several binaries and the IDL_PATH.

    Type: **setenv PATH /gen/topex2/bin:/opt/bin:$PATH** [return]
    Type: **source /opt/idl/bin/idl_setup** [return]

16. Change to the AIF processing directory.

    Type: **cd /gen/topex2/aif** [return]

17. To see what files are available at JPL.

    Type: **lsjplaif** [return]

18. Run the automated daily processing system. This will take approximately 1.5 hours for a full 24-hour AIF.

    Type: **stdaif *fileutc*** [return]
    (note: fileutc would be in the format as YYYYDDDtHHMMSS.)

The automated daily processing will print the following products:
aifsci, the daily science product
dailyeng, the daily single-page engineering product
aifcal, the daily CAL mode product
aifhdr, the processing summary
aifevents, the events listing

It will also create the following output files for any additional processing:
aif_eng_*fileutc*.std, 5-minute engineering averages.
aif_sci_*fileutc*.std, 10-second science averages.
aif_event_*fileutc*.std, an event report.
aif_eng_*fileutc*.db, 1-hour engineering averages.
aif_cal_*fileutc*.db, CAL mode averages.
aif_hdr_*fileutc*.db, a header report

19. If more engineering parameters need to be examined, run the idl program that plots all engineering parameters.

    Type: **aifeng *filename***, where filename is of the form **aif_eng_*fileutc*.std**.

20. If other types of processing is required, see **SPECIAL Processing Instructions**.

21. If task is completed, type: **exit**. Then, under File on menu bar, select **Quit.**

SPECIAL Processing Instructions

Note: Requests for ALT Science and Engineering instrument files should be directed to the TOPEX Data Analyst Office at 818/393-0701.

Definitions

***UTC*:** Coordinated Universal Time. Time is represented in the format "YYYYDDDtH-HMMSS", where YYYY represents year, DDD represents the Julian day of the year, and HHMMSS represents hours, minutes, and seconds. Eastern Standard Time = UTC Time - 5 hours. For example: 1993285t060203 represents hours, minutes, and seconds. Eastern Standard Time = UTC Time - 5 hours. For example: 1993285t060203 represents October 12, 1993 at 01:02:03 EST.

fileutc: The UTC portion of a filename. JPL creates their AIF filenames by using the UTC of the start of the data.

filename: The name of a file. Standard filenames consist of a prefix, a ***fileutc***, and a suffix, where the prefix and suffix identify the file type.

Instructions

1. Log on to osb3.

2. Your path must be able to access several binaries and the IDL_PATH.
   Type: **setenv PATH /gen/topex2/bin:/opt/bin:$PATH[return]**
   Type: **source /opt/idl/bin/idl_setup**

3. Change to the AIF processing directory.
   Type: **cd /gen/topex2/aif [return]**

4. You can check to see what files are available at JPL.
   type: **lsjplaif**

5. If you haven't already retrieved the data, retrieve the Engineering Instrument File.
   Type: **getjplbin '14.429::WFFDEV:[WFFUSER.WFF_DATA]*filename*[return]**
   Where ***filename*** is of the format **tcc_alteng_*fileutc*bin**
   (24 hours of data takes approximately 5 minutes to retrieve)

6. If you haven't already retrieved the data, retrieve the Science Instrument File.
   Type: **getjplbin '14.429::WFFDEV:[WFFUSER.WFF_DATA]*filename*[return]**
   Where ***filename*** is of the format **tcc_altsci_*fileutc*bin**
   (24 hours of data takes approximately 45 minutes to retrieve)

7. dotelem requires UTC Seconds for time selections. If you wish to do a time selection and don't know UTC Seconds, run utcconvert to convert from UTC Clock Time to UTC Seconds. Remember, Eastern Standard Time = UTC Time - 5 hours.

Convert the start time.
Type: **utcconvert**
Type: **2 [return]** in response to **Select UTC Time to Enter**
Type: ***UTC*** in response to **Enter UTC in the format YYYYDDDtHHMMSS**
Write down the time in seconds. You won't be able to remember it.
Type: **[return]** in response to **Press RETURN to Continue**

Convert the stop time.
Type: **2 [return]** in response to **Select UTC Time to Enter**
Type: ***UTC*** in response to **Enter UTC in the format YYYYDDDtHHMMSS**
Write down the time in seconds. You won't be able to remember it.
Type: **[return]** in response to **Press RETURN to Continue**
Type: **x [return]** in response to **Select UTC Time to Enter** in order to exit.

8. Run dotelem. Follow the on-screen menus to select what processing you wish to perform. Note that selecting by Latitude/Longitude does not work. The names of the output files will be printed on the screen after your processing selections are complete. They will also be written into an aif_???.log file. Write down the output filenames and wait until processing is complete.
   Type: **dotelem** and follow on-screen instructions.
   Type: **x[return]** in response to **Enter File Type** to exit.

9. Use the following table to choose what output command corresponds to your processing selection. Run that command by typing it.

Table of Processing Selections & Output Commands		
Processing Selection	Output Command	Description/Comment
0. Do Standard Processing	n/a	Previously documented.
1. Create AIF Databases	n/a	No output commands available.
2. Dump Telemetry	n/a	Load into spreadsheet of view on-screen.
3. Average Science Data	aifsci *filename*	Plot science data.
4. Average Engineering Data	aifeng *filenam*e dailyeng *filename*	Plot single-page selected engineering data.
5. Average Waveform Data	topexautowf *filename* topexwf *filename*	Plot auto-scaled waveforms. Plot fixed-scale waveforms.
6. Report Status Changes	n/a	Print or view on-screen.
7. Create SDR	n/a	No output commands available.

Abbreviations & Acronyms

AIF	Altimeter Instrument File
ADP	Algorithm Development Plan
ADT	Algorithm Development Team
AGC	Automatic Gain Control
APL	Applied Physics Laboratory
CAL	Calibration Mode or Calibration Mode data
CSC	Computer Sciences Corporation
CNES	Centre National d'Etudes Spatiales
COTS	Commercial Off-The-Shelf
EM	Electromagnetic
ENG	Engineering Data
EU	Engineering Unit
FTP	File Transfer Protocol
GDR	Geophysical Data Record
GSFC	Goddard Space Flight Center
HDR	Header data
IGDR	Intermediate Geophysical Data Record
IDL	Interactive Data Language
JPL	Jet Propulsion Laboratory
NASA	National Aeronautics and Space Administration
NSI	NASA Science Internet
RASE	Radar Altimeter System Evaluator
SCI	Science Data
SDR	Sensor Data Record
SDS	Science Data System
SIS	Software Interface Specification
SDT	Science Definition Team
SEU	Single Event Upset
STR	Selected Telemetry Record

SWDT	Software Development Team
SWH	Significant Wave Height
TGS	TOPEX Ground System (TGSA, TGSB, & TGSC VAX Cluster)
TMR	TOPEX Microwave Radiometer
TOPEX	Ocean Topography Experiment
UTC	Universal Time Coordinated
WFF	Wallops Flight Facility